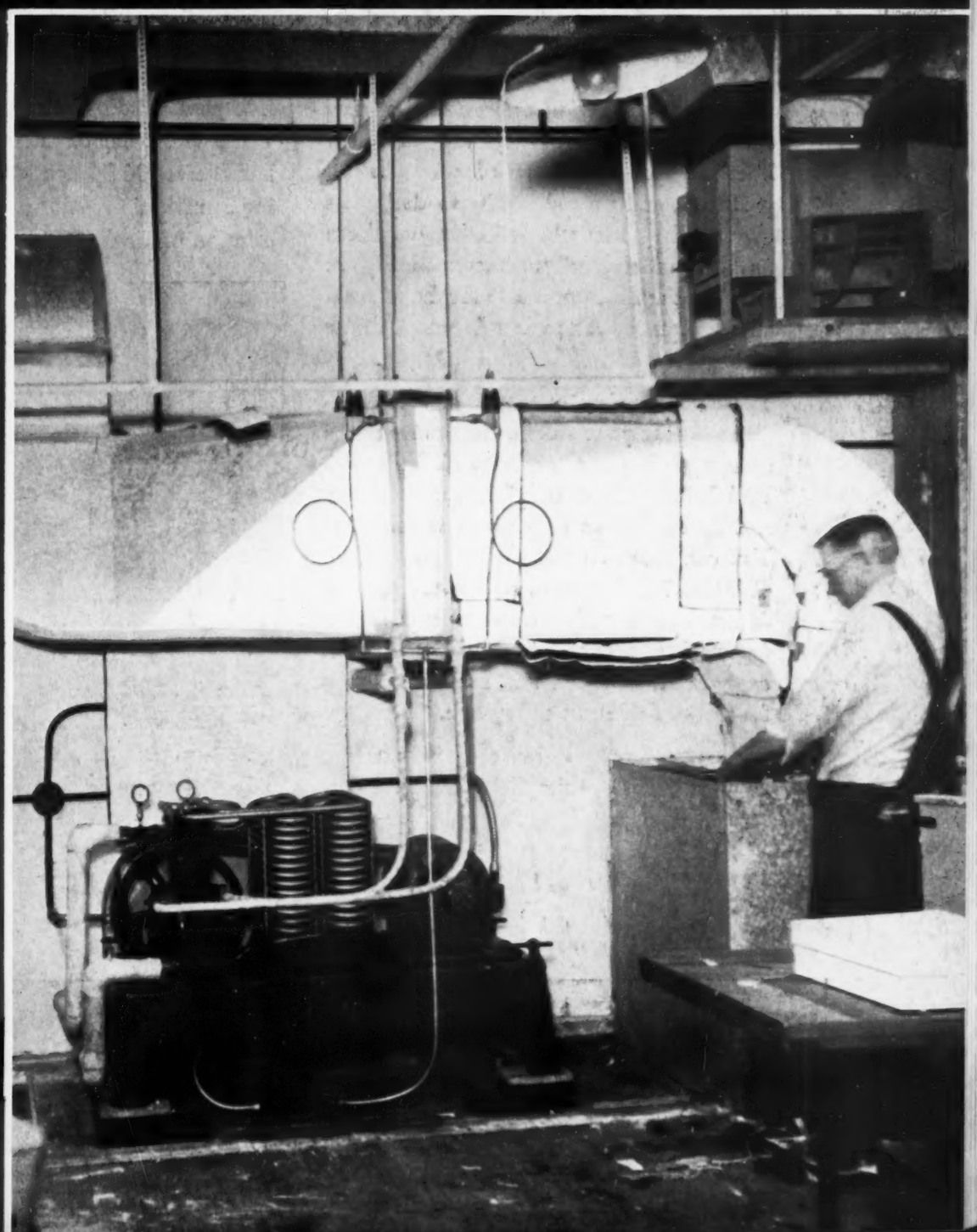
AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING

AIR
CONDITIONING
SECTION
PAGE 59



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APRIL
1939

LAMNECK SERIES 700 SYSTEM
PREFABRICATED DUCT AND FITTINGS

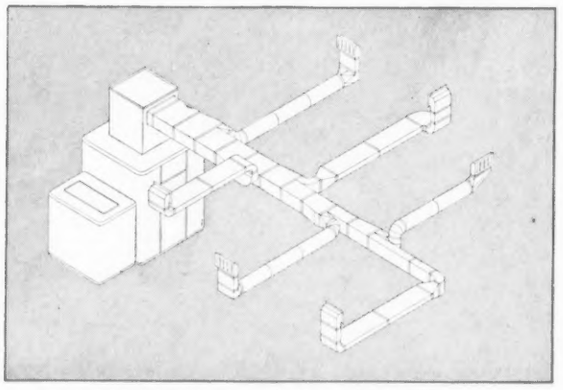
PREDETERMINED PERFORMANCE

An Advanced System . . . . ENGINEERED RIGHT to INSURE Correct Performance

• Long successful experience in building efficient air distribution systems, thorough knowledge of today's complex installation problems, and proved ability to design an advanced system which will solve these problems satisfactorily and economically are the three factors responsible for the remarkable acceptance of the new Lamneck Series 700 System.

These three prime essentials of sound engineering are your absolute insurance of the correct performance of Lamneck Series 700 Prefabricated Duct and Fittings under any and all conditions of modern installation. You can count on the perfect adaptability of Series 700 System to meet every present day requirement of air conditioning because dependable *predetermined performance* is engineered, designed and built into every feature of this advanced system.

Because of its extreme simplicity, complete flexibility and startling economy the most eminent warm air heating engineers in the industry hail Series 700 System as the most outstanding contribution so far made to the practical solution of air distribution problems.



Lamneck Series 700 Standard System

You'll understand why these authorities endorse Series 700 so unqualifiedly when you see it yourself. Meantime write for the new Lamneck Series 700 Catalog, and the name of your nearest Lamneck distributor.

LP INC.

LAMNECK PRODUCTS, INC.

414 DUBLIN AVENUE • COLUMBUS, OHIO

PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF RESIDENTIAL WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

How Furblo Protects YOUR PROFITS

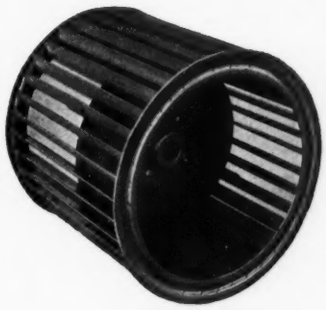


Fig. 1
(See text)

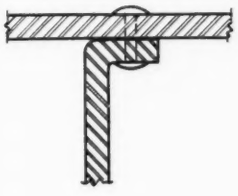


Fig. 2
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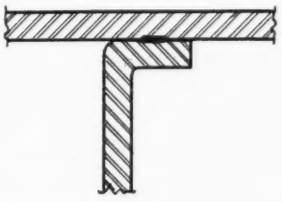

Fig. 3
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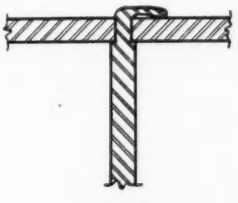

Fig. 4
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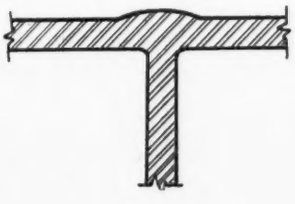

Fig. 5
(See text)

A centrifugal blower wheel (Fig. 1) made up of 48 blades and 2 end rings, has 48 + 2 = 50 separate parts fastened together at the blade ends at 48 × 2 = 96 points.

If the blades are riveted to the end rings (Fig. 2), or spot welded (Fig. 3) or if the blades protrude through the rings and are peened over (Fig. 4), the assembly still consists of 48 + 2 = 50 separate parts held together more or less securely at 96 points.

Now consider that if a 48-blade wheel delivers 1600 cfm, each blade moves a dead weight of more than 150 tons of air during one heating season. Is it any wonder, then, that riveted, spot welded or peened joints between blades and end rings might become slightly "rickety" in time and bring annoying complaints from customers of a jingling noise or a rattle or vibration hum—complaints of a type that are especially annoying and costly to you because they are so hard to correct.

Contrast such construction with FURBLO'S ELECTRIC ARC WELDED Wheel, which completely eliminates "joints" between the parts (Fig. 5) by fusing the metal together at a temperature of 6500 degrees F. into one JOINTLESS piece.

This is one of several reasons why FURBLO is the only blower that offers you the protection of a 5-year guarantee.

INSTANT READING PIPE SIZE CHARTS FOR FORCED AIR HEATING

For quick ESTIMATING, these charts tell you at a glance and without figuring, what size warm air supply duct a room of given size requires. An accompanying table tells you the furnace size and the blower size required for the house. They are published in FURBLO ENGINEERING BULLETIN No. 21 (1939 Series).

■■■■■■■ MAIL THE COUPON NOW ■■■■■■■

Furblo Co., Hermansville, Mich.

Tell me all about the FURBLO BULLETINS and ENGINEERING SERVICE; also send catalog and prices.
The jobber through whom I buy blowers is (name) .....

(address) .....

My name .....

Address .....

AAApr39 .....

In This Issue

ONCE again this industry approaches the season when cooling becomes more necessary than heating. What will this coming season bring? Will cooling reach the sales peaks so long anticipated, or will we see another year of steady progress without any fireworks? We do not attempt an answer, nor even an analysis of what is to come. We do recognize the changing season and, so far as we can, alter the weight of information published from heating to cooling. This month's cover shows application of cooling in a field some say is "ready to go"—small commercial cooling.

★

This month's editorial and the article which prompted the editorial (Specifications for Gas-Fired Winter A.C. Systems) on page 70, focus attention on a problem now confronting many communities and likely to confront others unless something drastic is done immediately. We refer to the practice of designing and installing winter air conditioning systems contrary to all the sound principles of our industry. This situation, to our way of thinking, is not a problem for gas companies—it goes far beyond any such restricted effort—and is undoubtedly a problem which will require the combined efforts of utilities, contractor associations, equipment manufacturers, and every individual who does not want to see winter air conditioning taken away from us just because some people are too greedy.

No better proof of the need for design and installation codes and licensing ordinances has come to our attention. We have been advocating codes and licensing since 1932—quite a while you will agree—and today the need for such regulation is more acute than any year previously.

★

The last two convention reports of the year save one (Pennsylvania, at Beaver Falls, June 15 and 16) are published in this issue. This year the state meetings have come close together, even overlapped; attendance at some meetings has been greater than expected; at others only a handful turned out. The reason? Probably no one knows. Programs have been uniformly good—and practical—convention cities have sometimes not been centrally located; the weather has been bad, business hasn't been too good for some members—perhaps these things—kept men away.

There is need for association. Perhaps not national organizations—the real problems these days are right in everyone's backyard and not in Washington. What is there which will drag men together—actively—that's what a lot of good men in this industry want to know.

AMERICAN ARTISAN

With which is merged

FURNACES AND SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor — A. A. Kennedy, Assistant Editor

Vol. 108, No. 4 — April, 1939 — Founded 1880

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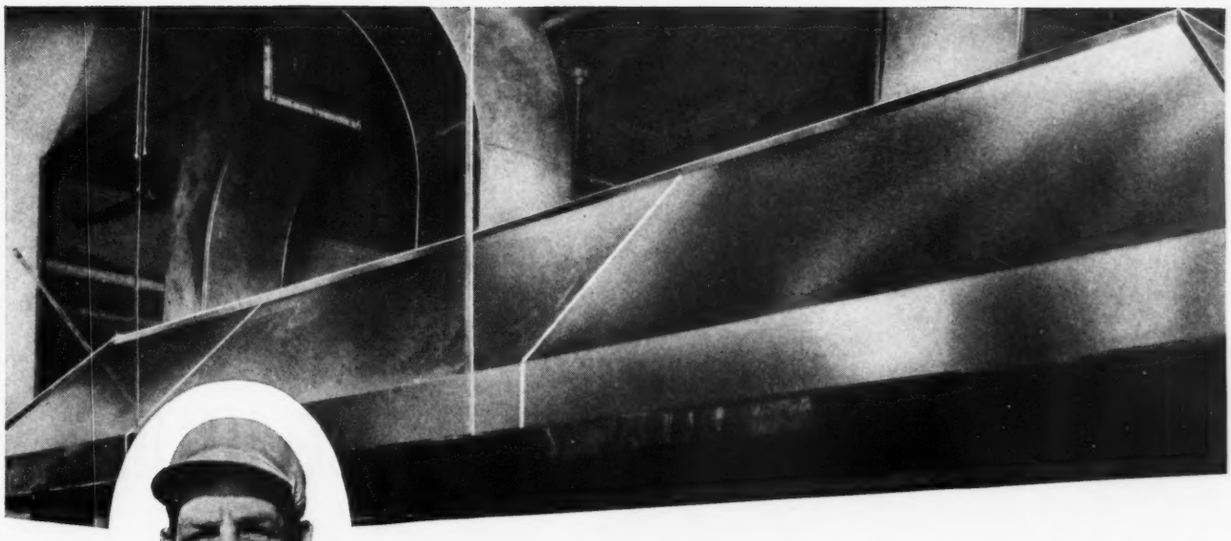
More than 8,000 Copies of this Issue are being distributed



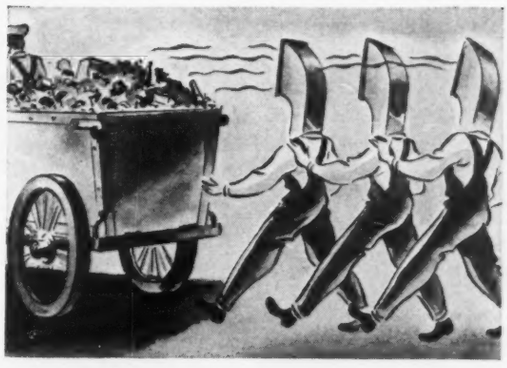
I *join the* HOODED KNIGHTS

by Tim Shears

DID I ever tell you about the textile mill that called me in on a ventilating job? It was nothin' but puttin' hoods over smells, and for that reason reminds me of the initiation parade, the time I joined the order.

Me and the other rookies are wearin' hoods and followin' a float full of flowers. At Main and Chestnut we halt for traffic. All we see from under our hoods is the ground. Then the float rumbles on, and we keep goin'! Suddenly the guy next to me gives me a nudge. "Where are they takin' us, Tim," he says, uneasy. "I don't like the *smell* of things myself," I answers. "Seems like the flowers on that float are breathin' their last."

With that I lifts my hood and takes a peek. "Solder me down," I yells, "we're not followin' the float at all. It's a garbage wagon!"



Getting back to ventilating hoods, also ducts, this textile job is a honey itself. Made out of 22 and 25 gauge standard Monel sheet. Any good sheet metal man used to galvanized steel sheet could make it. Here's how:

Cutting, forming and joining the ducts, you just follow good sheet metal practice. Hammering up the corner locks is a cinch. Because Monel is easy to work, and there's no coating to chip or peel off. For the sloping sides of the hood, you join three sheets with flat seams. On the corners you make flanged and bolted joints.

Soldering the joints you use ordinary cut acid or any regular flux, same as for soldering copper. Want to see what a slick job you can do with Monel? Take a look at the picture.

Making one of the duct elbows for a textile mill ventilating system. Installed hood and ducts are shown above. This is the kind of a job that is a cinch to do and brings in real money.

The neat, flat surfaces on both the hood and ducts are easy to get on any job when you're working Monel.

• • •

With all this clammer for air conditioning in hotels, restaurants and homes, a lot of you fellows must be doing a pile of duct work. So remember the kind that brings you real dough. You can pick up orders for Monel hoods and ducts in lots of textile and chemical plants. Their engineers know when Monel is OK for the job or we will be glad to advise you when Monel is suitable. It generally is. Just drop a line to . . .

TIM SHEARS

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York, N.Y.

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

THE ACCELERATOR DOES IT!

Heat acceleration to the experts

SOLID COMFORT IN THE HOME

THE MINNEAPOLIS-HONEYWELL Acratherm, which embodies the exclusive M-H principle of Heat Acceleration, has done more to revolutionize home heating comfort than any other single development in the last twenty years.

The secret is the Accelerator which "does things" for the heating system that are absolutely impossible with a conventional thermostat. It actually senses temperature changes before they occur and speeds up or slows down the heating system to meet them. The Acratherm is one of a series of controls developed by Minneapolis-Honeywell to meet modern automatic heating needs. Your customers look for the M-H Symbol when they buy heating equipment. They know M-H controls will bring them lasting satisfaction.

Minneapolis-Honeywell Regulator Co., 2726 4th Ave. S., Minneapolis, Minn. Branches everywhere.

MINNEAPOLIS-HONEYWELL

Brown Industrial Instruments *Control Systems*

Non-Freeze Uniform Temperatures using AEROFIN HEAT EXCHANGE SURFACE

NOW you may place heating coils in the cold air stream and obtain uniform temperature over the entire face of the coils even when steam is throttled for partial loads during freezing weather. The unique dual-tube design of this newest Aerofin development distributes steam so that stratification is prevented over the face of the coils at any percentage of heating capacity.

The new Aerofin Non-Freeze Heat Exchange Surface introduces steam from an inner tube, through orifices into the outer tube. The supply and return are located at the same end of the unit. In this way, the condensed steam flows back around the heated inner tube, preventing the condensate from freezing. This allows any degree of steam throttling without danger of freezing.

As an economy result, the necessity for using a separate tempering coil is eliminated, reducing the number of valves, traps and piping; and control is greatly simplified.

Aerofin Non-Freeze Coils are available now in one row units, giving a temperature rise from 0 degrees to 81 degrees at 5 pound steam pressure and 500 feet face velocity. For ventilation, where 0 degrees to 81 degrees or less are required, only one coil in depth is necessary, thus eliminating the use of a tempering and reheating coil. Aerofin Non-Freeze Coils can be used with Aerofin Flexitube where higher temperature rises are desired. Casings are of galvanized iron flanged for direct duct connections in Aerofin standard sizes. Overall casing dimensions are the same as Aerofin Flexitube, except for depth in direction of air flow. The depth of the coil casing is 5 inches instead of the standard 10 inch depth for Aerofin units.

All piping strains are transmitted to the casings without imposing any strains on the core. Each tube is free to expand or contract independent of adjacent tubes. Cores are pitched in the casings, allowing units to be installed in any position without pitching the heater casings.

These provisions for assurance of continuous heating without danger of freezing are available only in Aerofin Non-Freeze Coils.

Request your copy of the Descriptive Bulletin describing this newest Aerofin development.

AEROFIN CORPORATION
410 So Geddes St.
Syracuse, N. Y.

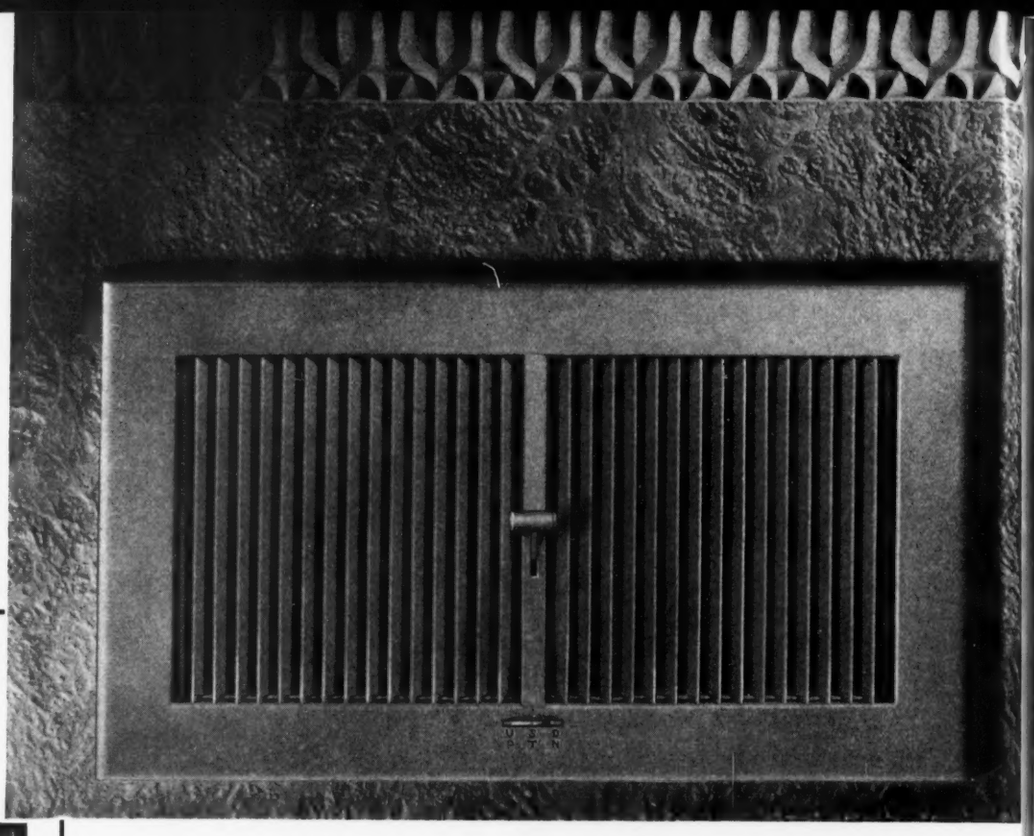
Please send at once your new illustrated bulletin describing Aerofin Non-Freeze Coils.

Name.....

Firm.....

Address.....

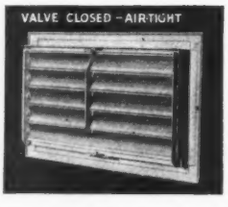
No. 86 DESIGN
with
TURNING BLADE VALVE



INSTANT ADJUSTMENT OF AIR FLOW (UP, STRAIGHT, OR DOWN)

is obtained by turning the regulator on the register face to the proper setting with the key furnished with each register.

When the valve is opened, as shown at right, the individual valve louvres automatically stop in position to provide the proper air flow — UP (Figure 1) for cooling systems to avoid drafts; STRAIGHT (Figure 2) for ventilating systems; DOWN (Figure 3) for heating systems to prevent stratification. When the valve is closed, as shown at right, it completely stops the flow of air.



AIR FLOW CAN BE QUICKLY ADJUSTED SIDEWAYS

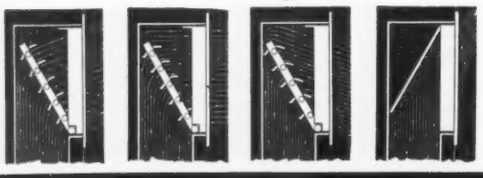
The air flow is controlled sideways by the vertical bars (⅜" deep on ⅜" centers) which may be turned 45° to either side with the same key used for turning the regulator. The register face is divided into two sections by an attractive vertical mullion. The bars in each section are connected with each other, so that by turning one bar in a section, all the bars in that section turn simultaneously, making it a simple matter to obtain practically any sideways deflection of the air.

Fig. 1 — 20° deflection UP; Regulator set at "UP"

Fig. 2 — Horizontal air flow; Regulator set at "STRAIGHT"

Fig. 3 — 20° deflection DOWN; Regulator set at "DOWN"

Fig. 4 — Air flow with conventional register.



Deliveries Are Now Being Made On This GREATEST of A. C. Registers

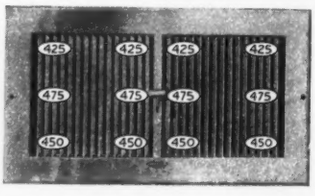
The acceptance of the new H & C No. 86 Design has been tremendous. And no wonder—it's the one register that incorporates all the features necessary to secure the best possible air distribution under all conditions.

Moreover, with just two types of faces (one with ⅞" projection and the other with 3/16" turndown), together with the regular H & C Frames, you are all set to handle any job, any time, and your register problems are solved.

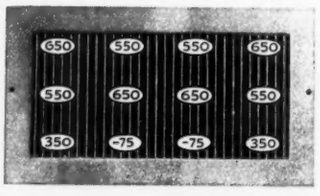
If you haven't already done so, see the No. 86 at your H & C Jobbers at once. The demand for it is unusually heavy and we suggest, therefore, that you place your orders for stock at the earliest possible moment.

Complete descriptive literature on request.

Compare the Air Distribution



The turning blade valve of the No. 86 Design distributes the air evenly, smoothly and with uniform velocity over the entire face as shown at left. This permits smaller or fewer registers to be used. Compare with air distribution of conventional register shown at right.



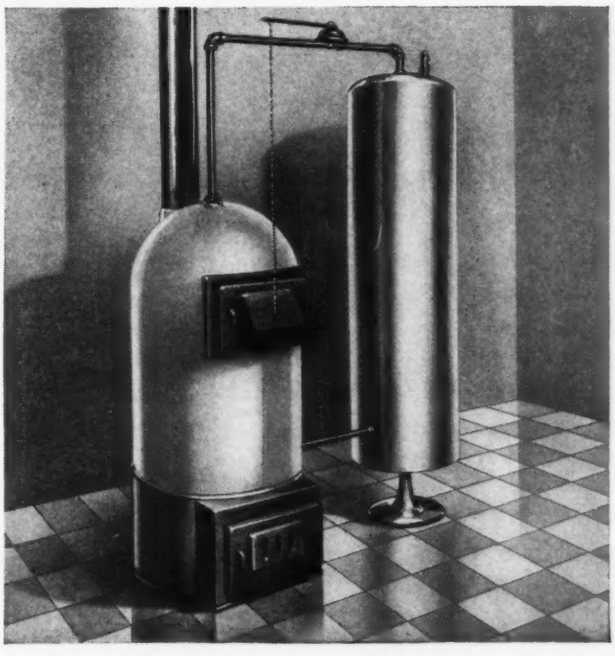
HART & COOLEY MANUFACTURING CO.

Warm Air Registers — Air Conditioning Grilles
Damper Regulator Sets — Dampers, Chain, Pulleys

61 W. KINZIE STREET, CHICAGO, ILLINOIS

ENGINEERING OFFICE AND FACTORY · HOLLAND · MICH.

The economical answer to an *annual spring problem* in the home



Everywhere, at this time of year, people are beginning to worry about the spring and summer supply of hot water. When the time to close down the winter heating plant arrives, "What to do about hot water" is a real serious question.

It's no problem in the home with complete modern Anthracite equipment. The modern Anthracite water heater with regulator, provides a constant supply of hot water, 24 hours a day, in ample quantities for every purpose—at ⅓ to ½ the cost of gas or electricity.

Modern Anthracite tank heaters are equipped with regulators that keep the water always hot—never too hot. They regulate drafts, eliminating all hand regulation. They save steps—save running up and down the basement stairs to light, adjust, and turn the heat on and off.

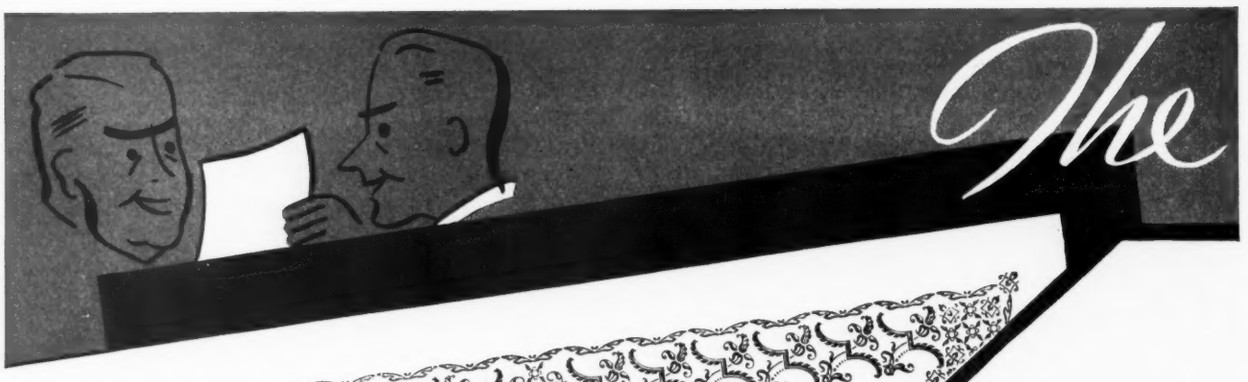
All of this convenience, plus the luxury of a constant, ample supply of hot water, costs as little as ⅓ as much as the same service with any other fuel.

ANTHRACITE INDUSTRIES, Inc.
Chrysler Building **New York, N. Y.**

THE 7 ESSENTIALS OF COMPLETE HEATING SATISFACTION

★ *COMFORT* ★ *CLEANLINESS*
★ *CONVENIENCE* ★ *HEALTHFULNESS*
★ *SAFETY* ★ *DEPENDABILITY*
★ *ECONOMY*

Save with Pennsylvania ANTHRACITE
(HARD COAL)
THE ONLY 7 STAR FUEL



TEN-YEAR
Maintenance Agreement
on the

INTERNATIONAL FURNACE..... (Number) installed..... (Month) (Day) (Year)

by..... (Heating Contractor) (Address)

for..... (Name of Owner) (Address)

at..... (Address of Installation)

WE AGREE

To furnish **without charge to the owner** shown above, direct or through the heating contractor as shown, any furnace casting which may become unusable from normal operation within a period of TEN YEARS from date of installation.

Furthermore:

We will **reimburse the owner** upon presentation of receipted bill, the cost of installation labor for any castings listed below not exceeding the following amounts:

GRATE BARS — ALL SIZES

Bar or Duplex	18" and 20"	$2.50	Larger Sizes	$3.50
Duplex Ring	18" and 20"	2.50	Larger Sizes	3.50

LOWER POT — UPPER POT — FEED SECTION — RADIATOR

	18"	20"	22"	24"	26"	28"	33"
Economy	$10.00	$11.00	$12.00	$13.00	$14.00	$15.00	$21.00
Carton		11.00	13.00	15.00	17.00	19.00	

Above allowances are for any one or any combination of the parts listed.
No labor allowance on other parts.

This Guarantee is contingent upon the furnace being installed with warm air and return air pipe sizes according to the Standard Code of the National Warm Air Heating & Air Conditioning Association. If installed with a blower this guarantee is contingent upon the use and proper operation of an approved automatic device to limit the air temperature in the furnace bonnet to a maximum of 200 degrees as specified by the National Board of Fire Underwriters.

THE OWNER AGREES in accepting this guarantee to permit a representative of the company to inspect the furnace at any time and if requested, to return any parts replaced, by freight collect, prior to payment of labor allowance.

INTERNATIONAL HEATER COMPANY

BY.....

TITLE.....

P-2480-A RM-9-38

MOST EFFECTIVE
SALES WEAPON IN THE HEATING INDUSTRY

TEN YEAR
MAINTENANCE AGREEMENT

More profit is now being made and more contracts closed by International dealers than ever before. Think of being able to tell your prospect that, outside of smokepipe repairs and cleaning, you will take care of his furnace for *nothing* during the next ten years. You will close more sales and make more profit because this plan is available on *International* furnaces only.

Like an Insurance Policy

The jobber is protected, the dealer is protected, the owner is protected. The Ten Year Maintenance Agreement is like an insurance policy and home owners are demanding International furnaces covered by this Maintenance Agreement. Competition is reduced to a minimum because none but International dealers can offer such complete protection.

Even Covers Grate Bars

Yes, under the Ten Year Maintenance Agreement, new grate bars are furnished for any which may become unusable. In addition the dealer is paid a *labor allowance* for installing the replacing parts. The Ten Year Maintenance Agreement makes selling easy. Send for complete information—today.

INTERNATIONAL
HEATER COMPANY

UTICA, N.Y., U.S.A.

Western Office and Warehouse, 1933 Wentworth Avenue, Chicago, Ill.
New England Office and Warehouse, 110 Chestnut Street, Nashua, N.H.
Stocks carried in Principal Cities throughout the U.S.

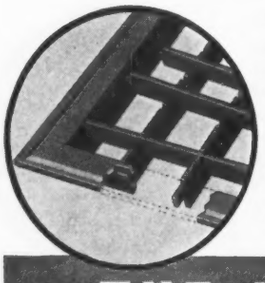
INDEPENDENT "FABRIKATED"

Cold air faces

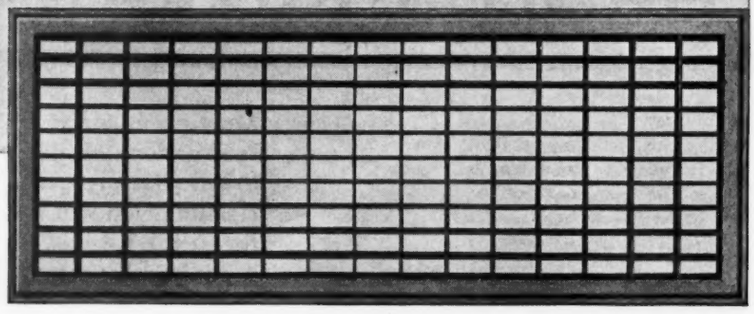
MADE TO FILL ANY REQUIREMENT

Whether you require the utmost in free air area or fine appearance, together with great strength and rigidity, you will find a type and a size in Independent "Fabrikated" that exactly meets the need. Cold Air Faces of Independent "Fabrikated" construction harmonize fully with the newest "Fabrikated" registers and grilles. Made in a wide range of standard sizes for prompt shipment, priced to give you best values.

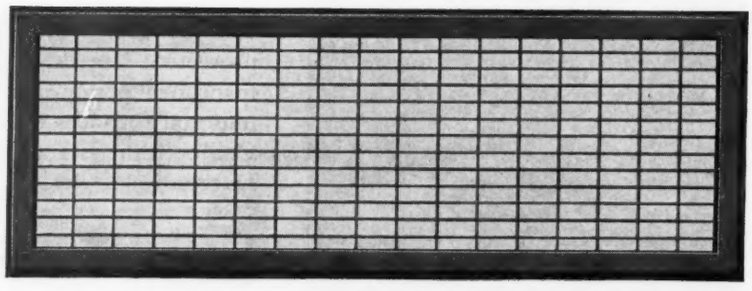
Send for new catalog



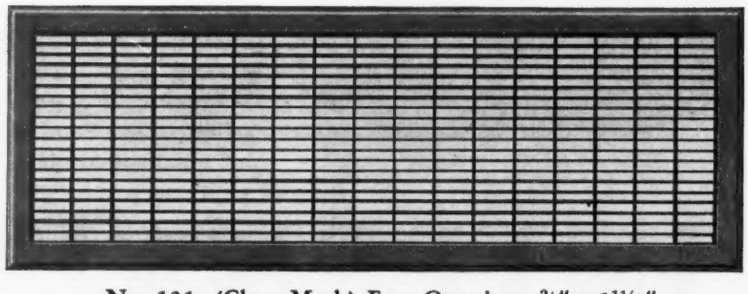
The bars are forced together, making the grille substantially one piece. Ends are clinched outside the frame so each member is sustained independently.



No. 130: Face Openings $13\frac{1}{16}$" x $1\frac{11}{16}$"



No. 132: Face Openings $\frac{5}{8}$" x $1\frac{11}{16}$"



No. 131: (Close Mesh) Face Openings $\frac{3}{8}$" x $1\frac{11}{16}$"

239

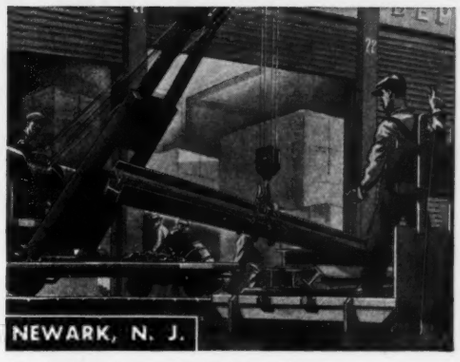
THE INDEPENDENT REGISTER CO.

3747 EAST 93RD STREET CLEVELAND, OHIO

8 WAREHOUSES THAT *Rush* AS ONE!

"Urgent phone call received on holiday —goods shipped that same day."

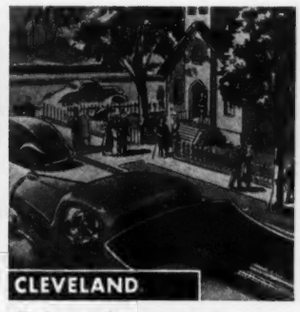
"Plates had to be cut to size—ordered 4:35 P.M.—shipped that night."



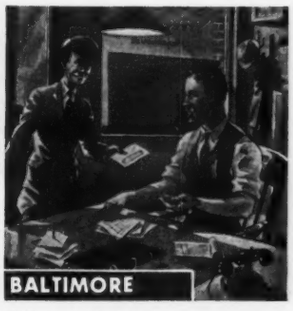
"Carload of beams for R. R. Bridge ordered 2 P.M.—shipped at 4 P.M."

"Emergency for flood work— —shipped in 3½ hours."

"Order received at 4 P.M.— shipped at 6 P.M."



"Order received Sunday— "shipped same day."



"Must receive tomorrow morning." (They did)

"Delivered in 6 Hours."

USS Scully Service

IT'S the same story with each of the eight Scully warehouses. They all operate on the principle that our customers always want their material shipped at once. Regular orders, special orders, rush orders—they all get Scully Service. (Of course, when you say "rush" we know you want extra prompt attention—and we act accordingly.)

Thousands of users know that when they want steel, steel products, copper and brass it pays to call Scully. They like the prompt, friendly Scully Service that they receive on every order whether for 10 pounds of steel or 10 tons.

Phone, write or wire the Scully warehouse nearest you. Each carries large stocks ready for immediate shipment. And ask for our complete Stock List and Reference Book. It's free, of course.

SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel, Steel Products, Copper and Brass

Warehouses at

CHICAGO · NEWARK, N. J. · ST. LOUIS · BOSTON · ST. PAUL-MINNEAPOLIS
CLEVELAND · PITTSBURGH · BALTIMORE

UNITED STATES STEEL

DAMP BASEMENTS OR HUMID CLIMATES DO NOT MEAN "Danger" TO CENTURY MOTORS

A new insulation process that resists the absorption of moisture into the winding — which is a frequent cause of motor breakdowns — has been developed by Century to give added protection to motors installed in damp basements or damp climates. This added protection guards against breakdowns which result in complaints, dissatisfied customers, costly service calls and lost time.

Use this new Century insulation feature as an important sales point to help you sell more of your appliances.

The problem is simple — moisture, if absorbed in the winding, causes electrical leakage and possible destruction.

Basements are naturally damp, and the possibility of soaking up moisture often occurs in the summer period when heating equipment is idle and the motor sweats and does not get a chance to run and dry out.

Don't buy your new purchases of appliances until you ask your supplier about the Century motor with the new insulation. Insist on this extra protection at no extra cost.

Century MOTORS

CENTURY ELECTRIC COMPANY
1806 Pine Street • • • St. Louis, Mo.
Offices and Stock Points in Principal Cities

Atlanta • Baltimore • Boston • Buffalo • Chicago • Charlotte • Cincinnati • Cleveland • Dallas
Denver • Davenport • Detroit • Houston • Indianapolis • Kalamazoo • Kansas City • Los
Angeles • Milwaukee • Minneapolis • New Orleans • New York • Omaha • Philadelphia
Pittsburgh • Rochester • Salt Lake City • San Francisco • Spokane • Seattle • Tulsa

ONE OF THE LARGEST EXCLUSIVE MOTOR MANUFACTURERS IN THE WORLD

Victory in Sports goes to Steel

★The theme song of America is improvement and speed, and so Sport joins the long list of activities that turn for both to steel. Your drive is longer, truer because of a steel shaft on your golf clubs; your play more enjoyable due to perfect conditioned, well watered courses made possible through the use of steel pipe sprinkler systems; shoe cleats of steel grip golf fairway and running track; steel horse shoes speed the favorite across the finish lines; and racing automobiles, airplanes, speedboats, yachts would be impossible without fine steels.

Every moment of our lives we depend on steel in not one but many forms. We get up in the morning after a restful night on steel springs, we shave with a steel razor, we eat meals prepared on steel ranges, we ride in steel trains or cars, we work in steel-framed plants or buildings.

The steel for every one of these products must be *exactly right for each particular use.* At Youngstown every pound of steel sold is developed through research for its special use, no matter how small the order may be.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods - Wire - Nails - Unions - Tie Plates and Spikes

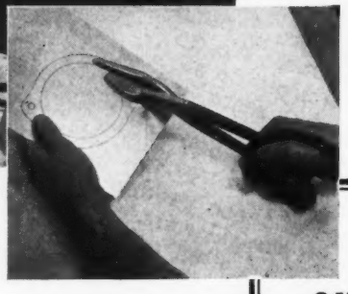
25-12B

QUALITY TRADE MARK YOUNGSTOWN SERVICE

YOUNGSTOWN

CRESCENT SNIPS

are different!



The CRESCENT SNIP line includes 4 patterns—12 sizes—in conventional, circular-cutting, combination, and heavy-duty types. No. U412, Combination Cutting Snips priced at $1.75 shown above. No. T412, Circular-Cutting Snips priced at $1.75 shown at right.

■ The first thing that impresses you when you examine and handle a Crescent Snip is its better balance and superior design. But that's only the starting point of Crescent performance, for these tools are forged from special-analysis steel and manufactured by methods and equipment exclusively Crescent's.

Crescent Snips are *entirely* drop-forged. Blades are hardened all the way through... no amount of grinding can remove their hard cutting edge. Blades are *not sprung* to give them the necessary tension for clean shearing... but are *ground* to permanent shape from the solid forging. Blade contour is so designed that it maintains the most effective shearing angle at all times throughout the cutting stroke.

These are but a few of many reasons why Crescent Snips *are* different. Try a pair! There is a Crescent pattern for every type of service—all fully guaranteed.

CRESCENT TOOL CO.

JAMESTOWN, N. Y.

30-122

OTHER CRESCENT QUALITY TOOLS FOR THE SHEET METAL WORKER'S KIT

No. AC110—
10-INCH CRESTOLOY WRENCH . . $1.50
Made in 7 sizes, 4 to 24".

No. 1046—ALL-STEEL HACKSAW FRAME . . $1.00
Others with wood, steel and composition handles.

No. 73—SCRATCH AWL AND SCRIBER . . 35c
Fine tool steel blade extends thru handle.

No. L26—
5-INCH THIN SLIP-JOINT PLIERS . . 50c
Other types include Diagonal Cutters, Side Cutters, Long Nose, etc.

CRESCENT and Smith & Hemenway TOOLS

Mueller's exclusive new Heat Levelizer evens home temperature more effectively than man or machine has ever been able to do. Gives economy of operation never known before. Provides lifetime satisfaction for your customers.
NOTE TO DISTRIBUTORS AND DEALERS:
Mueller announces nationally this great new invention to the home owning and building public in the May issue of AMERICAN HOME and BETTER HOMES & GARDENS. More than 3,000,000 home owners and builders will be exposed to this story of the amazing Heat Levelizer. Familiarize yourself with this remarkable development in gas heat. Write today or send coupon below for full data.

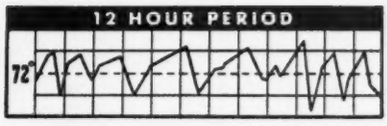
Amazing Invention — Mueller Heat Levelizer for Gas Furnaces Ends Uneven Heat

COAL — Mueller offers a complete line of coal-fired furnaces in cast iron and steel. Also a new furnace with exclusive features for stoker use.

OIL — Mueller's achievements in oil heat are the talk of the industry. Patented Air Conditioning Oil Furnace cuts fuel cost—assures complete comfort with air conditioning.

GAS — Heat Levelizer and Heat Speeder, exclusive with Mueller Gas Era Furnaces, assure comfort and convenience at low cost. Mueller also manufactures a line of Gas Era Boilers.

Heat Levelizer supplies a continuous flow of regulated heat, turning the flame up or down as needed to maintain an absolutely uniform temperature. It is not "on-and-off" control.



WITHOUT MUELLER HEAT LEVELIZER

This is how a chart of the temperature looks in most any home with ordinary thermostatic control. This is typical of the performance of most gas-fired furnaces. On-and-off operation causes temperature variations and fuel waste.

WITH MUELLER HEAT LEVELIZER

This is a typical chart of 12 hours of Gas Era Furnace operation with Mueller Heat Levelizer. Outside temperature may vary 20 to 50 degrees during the same period, while indoors you enjoy uniform temperature . . . no uneven heat.

This great new invention cuts fuel costs to the bone. It puts automatic gas heat within reach of people who never thought they could afford it before. It ends fuel waste . . . Supplies all the heat desired . . . No more . . . No less. The Heat Levelizer is available only on Mueller Gas Era Furnaces. Mueller offers features found in no other heating equipment. Sell Mueller—the "All-Star" Line for '39. It gives you a big edge on competition.

SEND FOR FREE FURNACE BOOK

Post yourself on the amazing changes taking place in home heating. Get your facts from the one unbiased source—MUELLER—who makes all types of heating equipment for all fuels. Send coupon for Mueller's great new book.

MUELLER (m) MILWAUKEE

HEATING AND AIR CONDITIONING

COAL • OIL • GAS

SEND COUPON TODAY

•

L. J. MUELLER FURNACE CO.
2010 W. Oklahoma Ave.
Milwaukee, Wis.

L. J. MUELLER FURNACE CO.
2010 W. Oklahoma Avenue, Milwaukee, Wisconsin

Please send me "THE NEW TREND IN HOME FURNACE DESIGN", also literature describing

☐ Heat Levelizer
☐ Gas Furnaces ☐ Coal Furnaces
☐ Oil Furnaces ☐ Gas Boilers

Name_____

Address_____

City_____ State_____

How a SNAPSHOT landed a $4900 Sheet Metal Job

HERE'S a sheet metal success story from the files of E. J. J. Mickley, 134 East Second Street, Bethlehem, Pennsylvania. Mr. Mickley says:

"I was bidding on a roofing and ventilating job for a textile company in Easton, Pa. I'd studied their set-up carefully . . . knew my bid was right.

"But the textile people were doubtful of my ability to handle this particular type of work.

"So I gave them proof—a photograph of a practically identical ventilating job I'd done for an Allentown company, using Bethlehem galvanized sheets.

"The picture was a good investment. It cost less than $1.00 and it brought in $4900." You'll find this experience is one you can turn to your own profit. It's a practical way of selling a prospect on your ability to handle his job to his complete satisfaction.

★ ★ ★

You'll find, too, that Bethlehem sheets are excellent material to work with, regardless of the size or nature of the job. They're bright, evenly spangled. They form easily into smooth workmanlike seams and curves.

The camera will bring out these good points to your prospect more powerfully than hours of sales-talk. A job made with Bethlehem sheets is its own best salesman.

BETHLEHEM *GALVANIZED* **Steel Sheets**

BETHLEHEM STEEL COMPANY

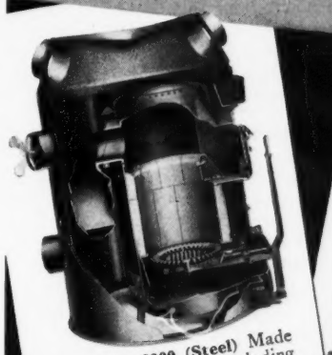
BETHLEHEM STEEL

Over 250,000 Gravity Furnaces will be Replaced this year

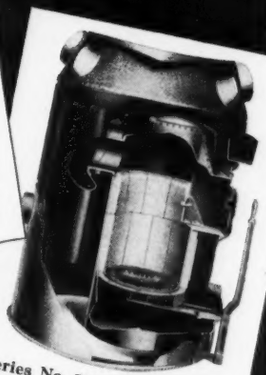
Capture YOUR SHARE through

SUNBEAM

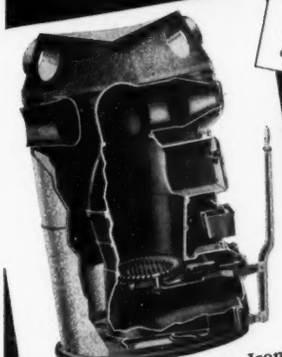
LEADERSHIP



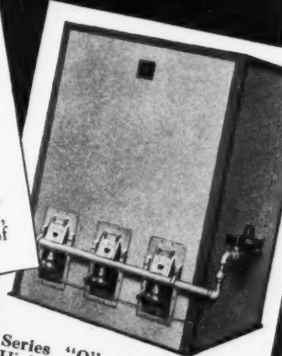
Series No. 8000 (Steel) Made of finest materials including riveted and welded No. 7 gauge boiler plate steel.



Series No. 500 (Steel) Riveted and welded for long life and leak-proof construction . . . quality at a low price.



Series No. 1000 (Cast Iron) One-piece radiator, duplex grates, and machine-molded castings of uniform strength.



Series "O" (Gas Furnace) Highly efficient, moderate in price. Heating element of corrosion and rust-resisting steel.

A tremendous Furnace replacement market and a large new home market await aggressive dealers everywhere. One sure way to get your share is through SUNBEAM'S dominating leadership and the complete line of Sunbeam Furnaces and Air Conditioning Units.

You'll have the finest furnaces and air conditioners that experienced design and precision building can produce. You'll have consumer advertising that reaches prospects in your town. You'll have an easy time payment plan with payments deferred during the summer. You'll have Sunbeam Jobbers' warehouse stocks nearby for quick delivery. *And you'll have prices that meet competitive bidding and give you a greater profit margin.*

The complete Sunbeam line includes every type of furnace and air conditioner you will require . . . cast-iron or steel, for burning coal, oil or gas, in a variety of types and sizes. Write for the complete Sunbeam story, and the name of the nearest Sunbeam Jobber.

AMERICAN RADIATOR & Standard Sanitary CORPORATION

American Radiator & Standard Sanitary Corporation
Elyria, Ohio

Please send me complete details of "Profitable Leadership" with Sunbeam.

Name_____

Address_____

City_____ State_____

AA-4-39

Payne

GAS FURNACES *BUILD SALES!*

Payne gas furnaces *have to be good!* They're scientifically designed and precision built by engineers who have specialized in gas-fired appliances for more than a quarter century. There's a Payne gas furnace for every heating need — *a complete line* — even to the famous Payne "A" Vent Pipe.

PAYNE GAS FURNACES ARE IN DEMAND!

Payne's popularity throughout the natural gas belt and well into the manufactured gas territory has spread word-of-mouth advertising worth millions. But Payne doesn't stop there. Again, this year, Payne is conducting an intensive publication advertising program that will drive the Payne story home to hundreds of thousands of prospects — homeowners and home-builders, contractors and architects. This campaign not only is making people Payneheat conscious, *it brings the prospects in to you!*

PAYNE GAS FURNACES ARE BACKED BY *REAL* DEALER COOPERATION!

Payne stands behind its dealers 100% . . . with catalogs, mailing pieces, circulars, window strips, display cards, display stands and newspaper mats. The Payne house organ keeps dealers posted on vital trends — profitable sales ideas. *And Payne has perfected a plan for dealer advertising conceded to be one of the most generous and practical ever developed.*

PAYNE GAS FURNACES *MOVE!*

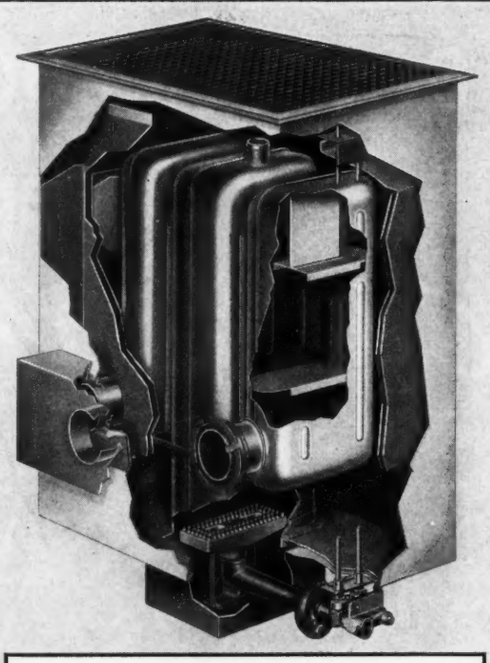
Because they are quality products . . . because they have full consumer acceptance . . . because Payne helps you sell . . .and finally because they are priced for a profit . . . Payne gas furnaces will PUT YOU OVER . . . this year and every year.

INVESTIGATE PAYNEHEAT TODAY!

Write for further information

THE IDEAL FUEL GAS

PAYNE FURNACE & SUPPLY Co., Inc.
BEVERLY HILLS, CALIFORNIA



PAYNE FLOOR FURNACE—Especially designed for homes without basement, but extreme simplicity of installation, economy—abundant fresh, *circulating* warmth—has made it a universal favorite. Fully vented.

PAYNE MODERN CONSOLE
Outstanding beauty! Efficient circulating warmth! They're both combined in this handsome floor type heater. Choice of five harmonizing colors in six different sizes. Heavy insulation assures absolute safety.

PAYNE FORCED AIR UNIT
Offers warm, filtered forced air circulation in winter, c-o-o-l-i-n-g ventilation in summer. Requiring no basement, the "FAU" may be installed in kitchen, closet or on the service porch. Automatic control.

PAYNE MODEL "A" FURNACE
May be installed singly or in batteries of two or more, each operating independently and warming separate rooms or suites. Here is *zoned* warmth, where you want it, when you want it, at controlled temperature.

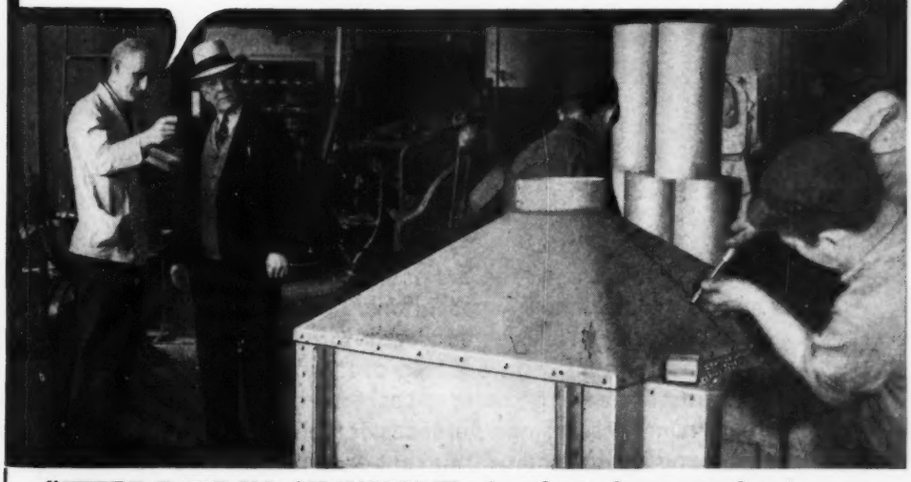
PAYNE ZONEAIR UNIT
The last word in "Spring-conditioning"—heats, filters, ventilates, humidifies and circulates. May be set up in batteries for zoned conditioning. Its streamlined beauty enhances any basement playroom.

PAYNE DUPLEX FURNACE
Combines multiple heating with low cost installation. Similar to the Payne Floor Furnace, the Duplex heats two separate rooms or suites on one floor or two floors. Optional push-button or thermostat control.

"You can't beat the genuine article

...that's why we use PARKER-KALON Screws for all our sheet metal jobs"

(Say thousands of sheet metal contractors)



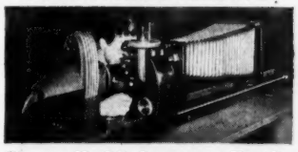
"WE TAKE NO CHANCES! **We found out long ago that it costs less to use genuine Parker-Kalon Sheet Metal Screws...we can always depend on their quality and performance. They are accurate to size, threaded full diameter to the head, assuring secure fastenings every time... and never any stripped threads or broken screw heads to annoy us and slow up the work."**

This confidence in Parker-Kalon quality, to be found in tens of thousands of sheet metal shops, is a tribute to the organization that created, developed and perfected the Hardened Self-tapping Sheet Metal Screw. Back of Parker-Kalon are twenty-five years of specialized screw manufacturing experience, unexcelled production processes and equipment—with laboratory facilities and personnel for maintaining and controlling the high standards for which Parker-Kalon Products are so well known throughout industry. It pays to insist on Parker-Kalon when you buy Sheet Metal Screws. Parker-Kalon Corporation, 200 Varick Street, New York, N.Y.

Sold Only Through Recognized Distributors

PARKER-KALON
Sheet Metal Screws

4 Reasons Why
YOU CAN DEPEND ON PARKER-KALON PRODUCTS



Unexcelled Laboratory Facilities **. . . The Parker-Kalon Laboratory which controls and maintains the high standard of quality for which Parker-Kalon Screws are so widely recognized, represents an investment of over $250,000.**

Specialized Production Equipment **. . . (including the Parker-Kalon Hardening furnaces illustrated) is required to produce Parker-Kalon Self-tapping Screws and to maintain their uniformly high quality. The Parker-Kalon plant is famed as the most up-to-the-minute plant in the industry, with a capacity of 8,000,000 Screws per day.**

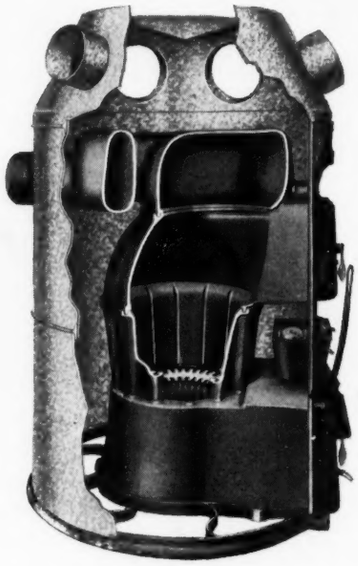
Free Engineering Service **. . . To assist designers and production men in obtaining better fastenings at lower cost, Parker-Kalon Assembly Engineers are available throughout the country. Their services are free to users of Parker-Kalon Self-tapping Screws as well as to those who wish to investigate the time-and-labor-saving possibilities of these Screws.**

Available Everywhere **. . . No matter where your plant is located there is a reputable supply house distributing Parker-Kalon Screws . . . assuring you of a dependable source of supply.**

WISE FURNACES

for GRAVITY *or* AIR CONDITIONING

The Wise line has a unit to take care of any problem you heating and air conditioning men are liable to run up against in making an installation. Shown at the left is the Wise Series "A" Air Conditioning Unit. The square enameled casing with its rounded corners and top moulding is extremely modern in appearance and will harmonize perfectly with newly decorated or modernized basements.



At right is shown the Series "A" Wise Furnace for new or replacement installations. Features such as the absolutely self-cleaning radiator, air cell smoke and gas consuming firepot, slip-over front, lower front and ashpit cast in one piece, cast iron base for square and round casings and furnaces for either gravity or air conditioning make this an exceptional unit for clean, healthful, economical operation. These features, found in no other furnace on the market, make it outstanding in performance and design.

WRITE TODAY for further INFORMATION

Illustrated at left is the Gas-fired Air Conditioning unit which uses either the steel radiator or the all cast iron Gas furnace as the heating element.

True air conditioning is at its best in this excellent unit. Well designed to give the utmost in efficiency and performance it will give you a decided edge on the competition.

WISE FURNACE CO.

AKRON - - OHIO

You can't beat a GOOD TERNE ROOF

On the old building shown above —Cathedral of St. Peter and St. Paul, Philadelphia—Taylor Ternes were used to cover the dome. After 56 years they were still in good condition.

A sheet metal contractor in Grand Meadow, Minn., used Taylor Ternes to roof his own shop. Thirty-three years later he reported that the roof was good for at least another thirty years.

Thousands of roofs, installed 50 to 100 years ago, today offer proof that nothing devised to date can beat well-made terne plate for roofing purposes. Roofs of this material are durable, easily installed, moderate in first cost, inexpensive to maintain, fire- and weather-resistant and attractive in appearance.

Republic offers the sheet metal contractor five brands—each made to the same exacting standards that have always been insisted upon by the makers of Taylor Ternes since this old reliable company was established in 1810. Now, as then, you can tell your customers with conviction—"You can't beat a good terne roof."

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND, OHIO

UNION DRAWN STEEL DIVISION • TRUSCON STEEL COMPANY
BERGER MANUFACTURING DIVISION
NILES STEEL PRODUCTS DIVISION
STEEL AND TUBES, INC.

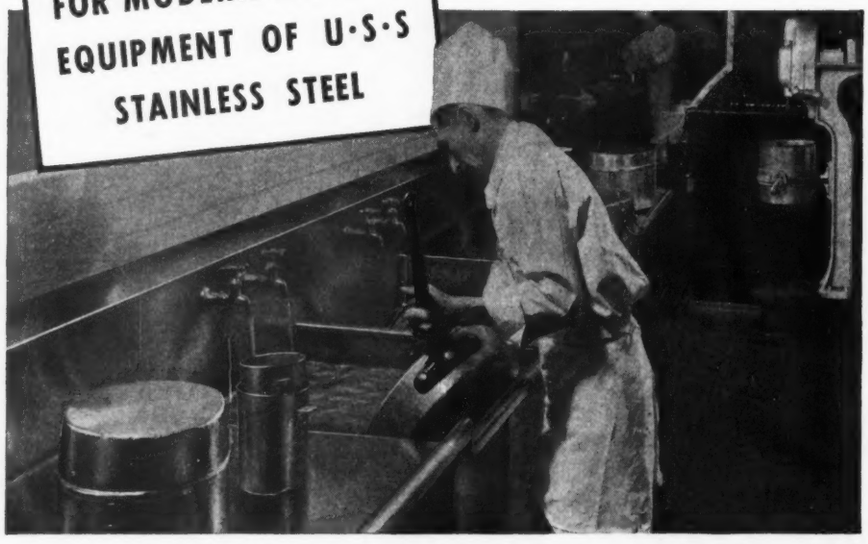
REG. U.S. PAT. OFF.
REPUBLIC STEEL

TAYLOR ROOFING TERNES

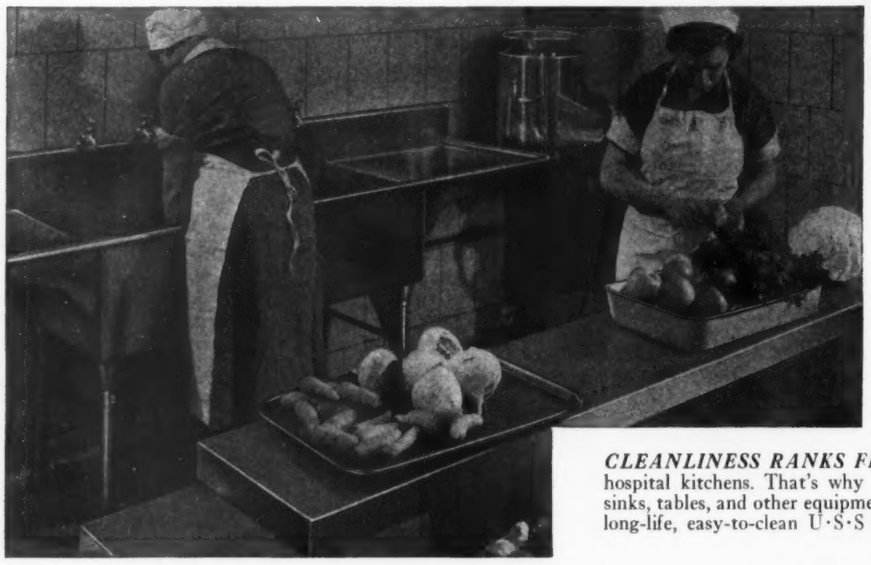
TARGET & ARROW—TAYLOR EXTRA COATED—OLD METHOD—AVALON—SAXON

Are *YOU* cashing in on this business?

THERE'S A BIG MARKET FOR MODERN KITCHEN EQUIPMENT OF U·S·S STAINLESS STEEL



HERE IS THE NEWEST of several U·S·S Stainless installations in the kitchen of an exclusive men's club. An 18-foot sink for washing pans. It was specially designed to fit a narrow space. It is an investment in cleanliness that will continue to pay dividends over a long period of years.



CLEANLINESS RANKS FIRST in the list of requirements for hospital kitchens. That's why the superintendent here is replacing sinks, tables, and other equipment as rapidly as can be arranged with long-life, easy-to-clean U·S·S Stainless Steel.

SHEET metal workers report a rapidly growing market for kitchen equipment fabricated to order from U·S·S Stainless Steel.

Hotels, restaurants, clubs, hospitals have had ample time to test out their original installations of stainless equipment. And finding that this metal lives up to every claim made for it, they are replacing old equipment as it wears out with bright, easy-to-clean stainless steel.

As more and more organizations find out that stainless steel equipment cannot rust, chip, or peel, that it is always easy to keep clean and sanitary, that there is no practical limit to its service life —as users find out these things about stainless, isn't it logical that the call for stainless equipment should increase?

That is exactly what is happening. And here is an opportunity for you to carve out some very tidy profits in a business that is sure to grow. Write for complete data and fabricating instructions on U·S·S Stainless Steel.

U·S·S STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
NATIONAL TUBE COMPANY, *Pittsburgh*
Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*
Scully Steel Products Company, Chicago, *Warehouse Distributors*

UNITED STATES STEEL

"Sharp Tuning"*

Sets New Standards of Automatic Temperature Control

*Trade-mark for White-Rodgers Device Registered, 1938, White-Rodgers Electric Co.

"Sharp Tuning"

In a radio, accuracy which insures undistorted reception. In a control, accuracy which insures perfect automatic regulation of temperature.

WHITE-RODGERS "Hydraulic-Action" Achieves Amazingly Accurate Performance

HYDRAULIC ACTION CONTROL

Just as "*Sharp Tuning*" selectivity brought new standards of radio reception, so White-Rodgers "Hydraulic-Action" with "*Sharp Tuning*" brings new performance standards in automatic temperature control. "*Sharp Tuning*" permits visible-dial selection of actuating temperature and differential with positive accuracy throughout the entire range of the instrument.

But "*Sharp Tuning*" accuracy is only one of the many big advantages of White-Rodgers "Hydraulic-Action" Control. This new operating principle permits the use of a high load capacity switch and provides a *positive snap-action and contact* . . . never before possible . . . which make controls immune to any normal vibration or "off-level" installation. White-Rodgers controls are easily installed and require no service attention. They cost no more than other far less accurate controls.

Specify and Install WHITE-RODGERS Controls on Your Equipment

See that the heating and air conditioning equipment you service has the most modern, efficient and dependable controls available . . . by specifying and installing White-Rodgers "Hydraulic Action" Controls. They not only provide "*Sharp Tuning*," but are sturdily constructed to give years of trouble-free service. Get full information by mailing Coupon today.

WHITE-RODGERS ELECTRIC CO.

1215 CASS AVENUE • ST. LOUIS, MO.

"Hydraulic-Action" controls are also available through Julien P. Friez & Sons, Baltimore, Md., Division of Bendix Aviation Corporation, for 63 years the Makers of America's Weather Instruments.

There's a WHITE-RODGERS "Hydraulic-Action" Control for Every Service Need

Single Speed Blower Control

These controls start the fan or blower when air in furnace bonnet reaches a predetermined temperature. They respond to rapid changes in bonnet temperature and are accurate throughout the scale, thus effecting close control of the temperature and differential. Range 100° to 300°F. Differential adjustable from 10° to 80°F. Type 513 has key adjustment which prevents tampering by unauthorized persons. Other models have knob adjustment. Also made in two-speed types.

TYPE 513 with Cover Removed

MAIL COUPON FOR DETAILS

WHITE-RODGERS ELECTRIC COMPANY
1215 Cass Ave., St. Louis, Mo.

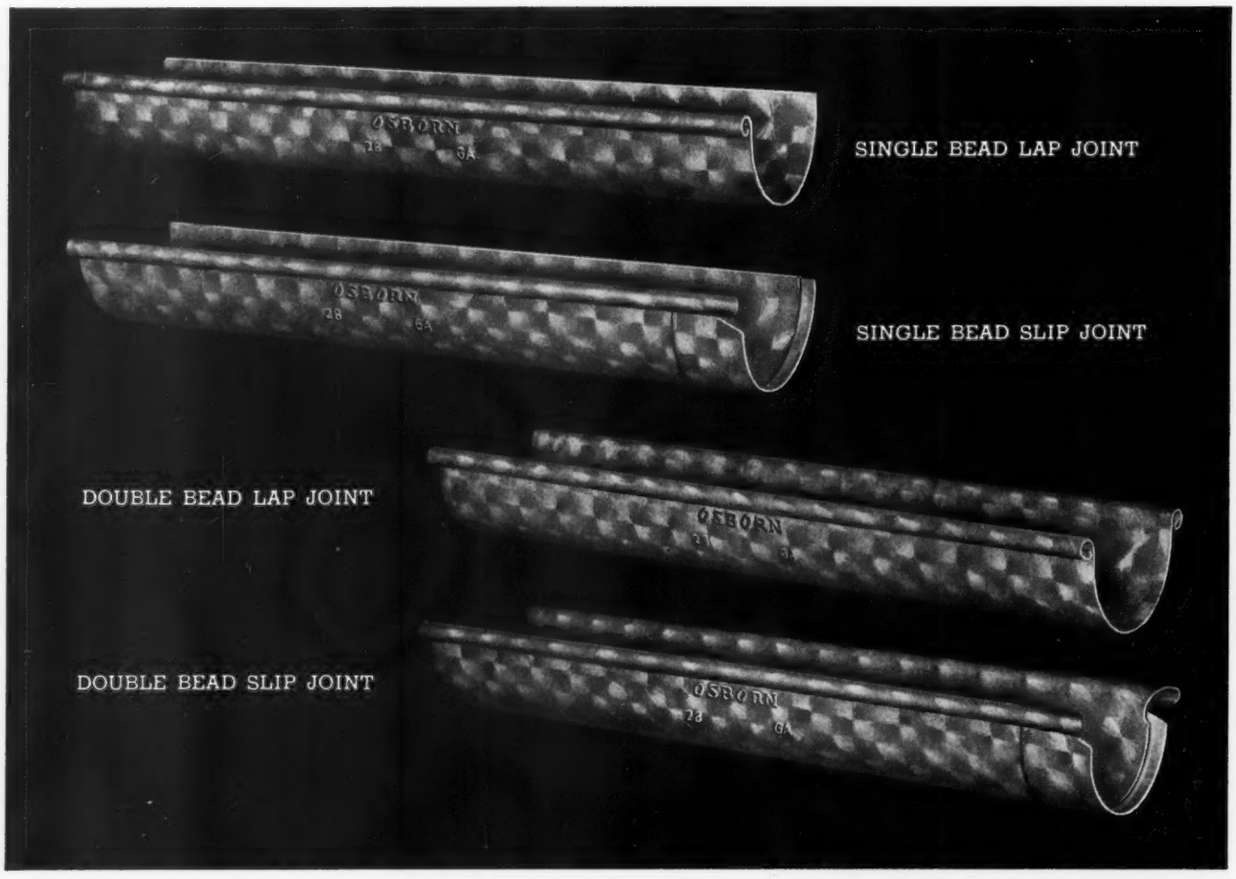
Gentlemen: I am interested in White-Rodgers "*Sharp Tuning*" for (type of product)_____

*Firm*_____

*Individual*_____

*Street No.*_____

*City*_____ *State*_____



BIG VALUE . . . At Nominal Cost

Few things that go into new construction or remodeling work cost so little yet are subject to so much abuse as the trough and conductor pipe on a home. Properly made and installed however, they withstand the ravages of wind, rain, snow and ice . . . adding convenience and protection against damage year after year.

Starting with richly spangled prime sheets, OSBORN trough, gutter and pipe are painstakingly made for the sheet metal men who do quality work at a profit. The reason they are assured of both is that OSBORN materials look well and wear long yet require a minimum of time to install because they are uniformly straight, fit right and go up easily.

OSBORN trough, gutter and pipe, as well as a complete line of accessories are stocked at our three warehouses in all standard sizes, gauges and materials. Use them on your jobs this spring. You will find that both you and your customers will be more than satisfied.

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO · CLEVELAND · DETROIT
Metals and Metal Products

The *Complete* Scott-Newcomb Line Offers a 12 Months PROFIT PLAN

Why the S-N Franchise Insures Profits Every Month of the Year!

The complete Scott-Newcomb Line of dependable, trouble-free, low-priced equipment will make you money because:

- Scott-Newcomb are pioneers in automatic heating.
- Long experience, large production and excellent factory facilities make it possible to produce quality at low, competitive prices.
- The Scott-Newcomb line is so complete that regardless of the season, there's an S-N product you can sell.

Scott-Newcomb offers you a complete range of both heating and cooling air-conditioning equipment. To make money month after month, you, as a distributor, must be able to sell heating equipment that caters to the buyer's individual demands . . . oil burners if your customer prefers liquid fuel . . . gas equipment if he prefers gas . . . stokers for solid fuel. You must be able to replace worn out heating plants with oil, gas or stoker fired boilers or air conditioning furnaces; when summer cooling is desired you must be able to supply unit room coolers, central cooling plants, attic fans, etc.

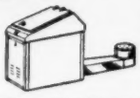
Scott-Newcomb makes it possible for you to offer all this modern equipment to architects, builders of new homes or those modernizing existing structures. If you are not now handling a line as complete as that offered by Scott-Newcomb you are missing big profits that should be yours.

Take advantage of the building boom that is gaining momentum every day, capitalize on this opportunity to sell a complete line of quality equipment at low prices, and you'll find the Scott-Newcomb franchise is a 12-month profit plan for you.

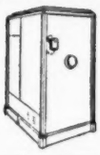
Write Today!

Store Coolers
3 and 5 ton capacities to meet the growing demand of this great market.

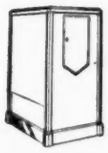
¾-Ton Room Cooler
A unit that really cools; quiet, attractive appearance.



Stokers for Hard or Soft Coal
15 to 1,000 lbs. per hour; also bin feed and ash remover types. Automatic air control and many exclusive features.

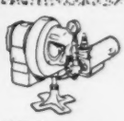


Oil and Gas Air Conditioners
Beautifully styled, efficient contra-flow types.



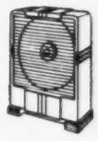
Oil and Gas Boilers
Steel and cast iron; beautiful design; efficient, low priced.

Oil Water Heater
Burns No. 3 oil; no storage tank required.



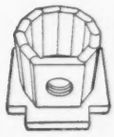
Oil Burners
From ½ to 20 g.p.h. Pressure and air atomizing. Dependable, trouble-free, low priced. The result of 20 years of experience.

Coal Furnace
Hand or stoker fired, or for oil or gas. With or without blower.

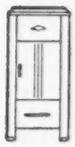


Attic and Ventilating Fans
All sizes.

Water Softeners
All sizes.



S-N Combustion Chamber
Cuts installation costs.

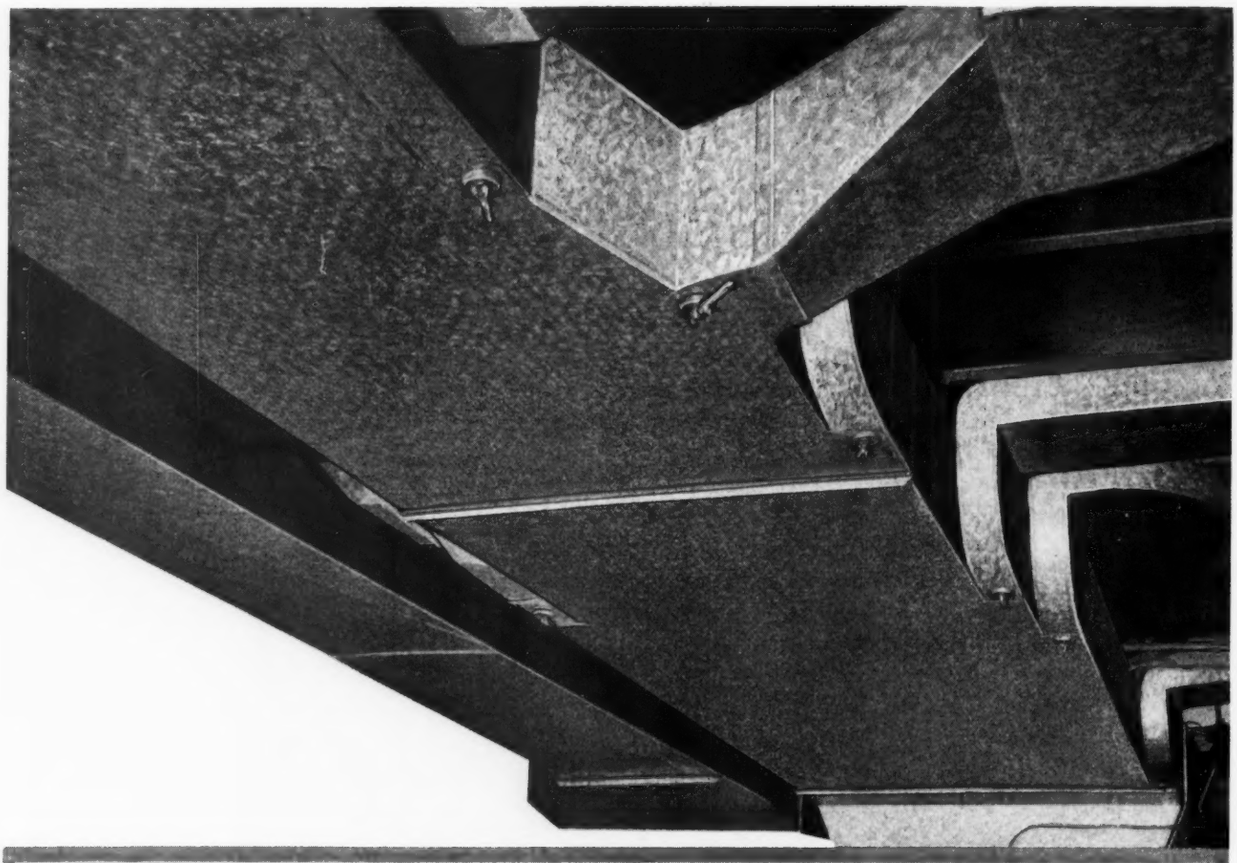


Space Heaters 4 Sizes
Water heaters 2 sizes. Furnaces all sizes. Gravity burners. No electricity required. For No. 1 oil.

SCOTT S N NEWCOMB

SCOTT-NEWCOMB, INC.

1922 Pine Street - - - St. Louis, Missouri



Get *Double Protection* with

Granite City Copper Bearing Soft-Forming Galvanized Sheets

Heavy spelter and rust-resistant copper add years of extra life—it's true economy

Here's a bargain for you and your customers! Granite City Copper Bearing Sheets cost so little extra that you can afford to use them for almost every job. More of your customers will want this added protection . . . and now you can give it to them at a cost far below its real value.

Granite City Copper Bearing Galvanized Sheets are uniformly flat and easy to form without flaking or fluting. Laboratory tests and special control throughout their manufacturing process insure an even coating of spelter which tightly adheres to the base metal. Customers everywhere appreciate the difference in Granite City Copper Bearing Galvanized Sheets in their neat appearance and added years of service.

Specify Granite City Copper Bearing Soft-Forming Galvanized Sheets on your next job. (Also available in standard grades). For more information, write:

GRANITE CITY STEEL COMPANY

GRANITE CITY ILLINOIS

SINCE 1878 GRANITE CITY SHEETS

1803 Boatmen's Bank Bldg., St. Louis • 8 So. Michigan Blvd., Chicago
1104 R. A. Long Bldg., Kansas City • 1602 Mariner Tower, Milwaukee
1613 Pioneer Building, St. Paul • 4000 York Street, Denver
77 McCall Place, Memphis • 435 Fifth Avenue Bldg., Moline, Illinois

There's More Opportunity with the DELCO-FRIGIDAIRE

Complete Heating and Air Conditioning Line

Built and Backed by GENERAL MOTORS GM

Get into the Swing of Year-'Round Full-Line Selling!

■ The records prove that dealers with a complete line make more money. It's easy to understand why:

If you are an air conditioning dealer only, your business peaks in the spring. If you're a heating dealer only, your business peaks in the fall. But if you are a Delco-Frigidaire dealer with the complete line of both automatic heating *and* air conditioning products you have a 12-months-a-year business! The complete Delco-Frigidaire heating and air conditioning line provides an outstanding opportunity for a profitable year-'round business because the products form a natural, logical combination with a practically unlimited market!

Now is the Time to Start!

Plan now to guard against seasonal slumps, provide year-'round employment for your salesmen, increase your total volume of business and make more money for yourself. Consider the big advantages of the complete Delco-Frigidaire line—backed by General Motors' well-known name and reputation for quality products. Consider the whole-hearted, intelligent cooperation offered to franchised dealers—training schools for your salesmen, effective selling tools, enlarged field organizations to help you solve sales and technical problems, leads derived from powerful advertising in national magazines and local newspapers, and many, many other helps.

Get all the facts. Mail coupon now!

DELCO-FRIGIDAIRE

DIVISION GENERAL MOTORS SALES CORPORATION

AIR CONDITIONING & HEATING PRODUCTS

Unit Air Conditioners · Portable Air Conditioners · Commercial Air Conditioning
Oil Burners, Stokers, Oil & Gas Boilers · Oil & Gas Winter Conditioning Units

YOUR OPPORTUNITY COUPON! MAIL IT TODAY

Delco-Frigidaire Conditioning Division
General Motors Sales Corporation
Dayton, Ohio, AA-4

Please rush complete information regarding a Delco-Frigidaire franchise backed by General Motors.

Name.....

Address.....

City..... *State*.....

THE CONVENTIONAL THERMOSTAT PREHEATER—AS DESIGNED FOR THE

TWO-ELEVEN

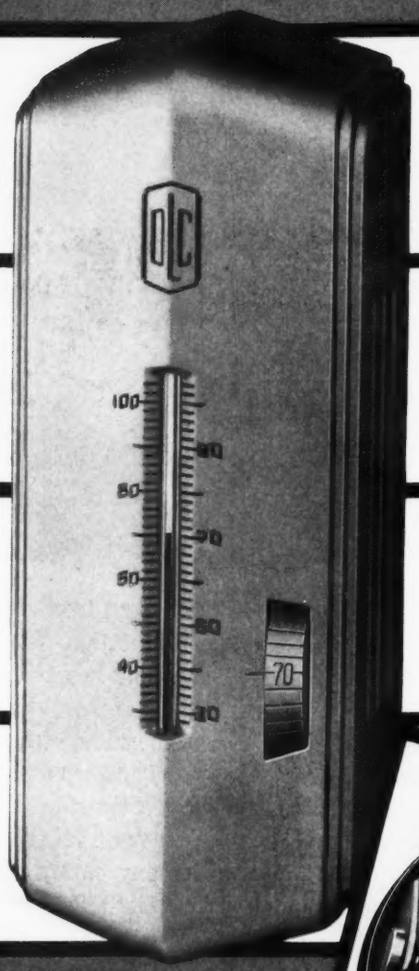
Is the Only One that Affords these Important Advantages

1 Preheater is not in load circuit, therefore it is not affected by variations in load.

2 Length of heating cycle is quickly adjusted with merely the aid of a screw driver.

3 The Preheater element for the Two-Eleven is the same for all instruments and all installations—dealers are not called upon to stock assorted heater elements.

4 No need to change the air gap adjustment on the bimetal blade.



5 No appreciable sag in indoor temperature curve because of the special construction of the Two-Eleven and the close balance between preheater output and thermostat differential.

6 Maximum sensitivity due to elimination of mass effect adjacent to the bimetal blade which leaves the blade free to react quickly to slight variations in air temperature.

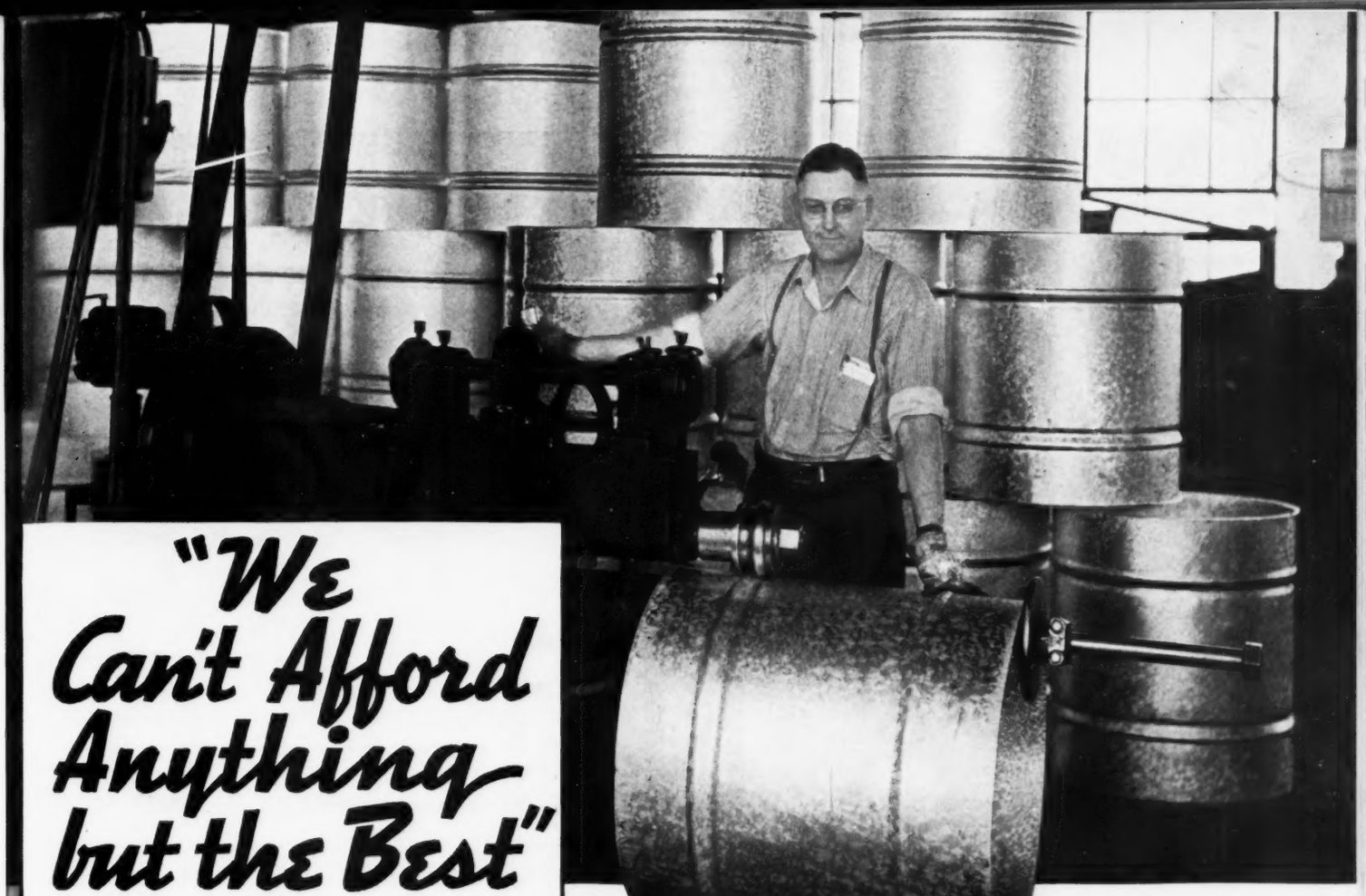
7 Sturdy construction—modernistic styling that harmonizes with all interiors.

For further details write for Bulletin 86.

DETROIT LUBRICATOR COMPANY

General Offices: DETROIT, MICHIGAN

Canadian Representatives: Railway & Engineering Specialties Ltd., Montreal, Toronto, Winnipeg



"We Can't Afford Anything but the Best"

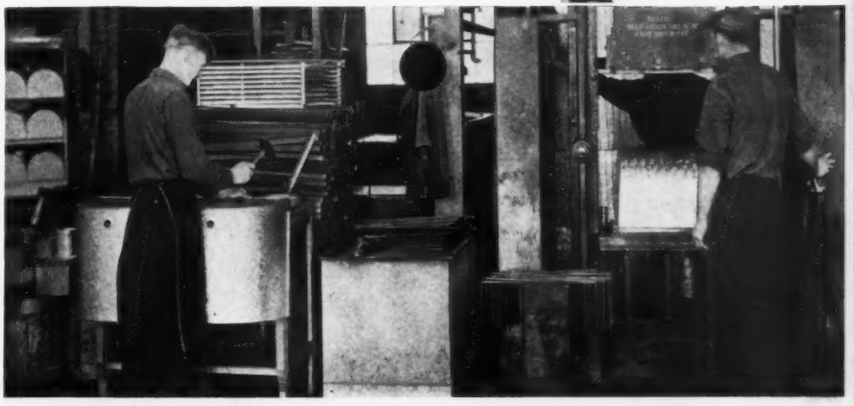
Here is a business that has been built up on the basis of quality. Every job becomes a salesman for another job. For that reason the manager of an Ohio manufacturing plant says: "The products we have turned out are so highly regarded that we can't afford anything but the best in material. We have worked with Superior Sheets for many years and they sure meet our requirements."

All Superior Galvanized sheets are made of special analysis open hearth (or copper-bearing) steel rolled to a uniform gauge, and correctly tempered for shop work. The Superior process of galvanizing has been perfected by many years of specialization in making coated sheets. Sheet metal workers who want to maintain the highest quality in their product may select Superior Galvanized sheets with absolute confidence. Distributors in principal cities.

THE SUPERIOR SHEET STEEL CO., CANTON, OHIO

Division of Continental Steel Corp., U. S. A.

THE SUPERIOR SHEET STEEL CO. TRADE MARK S REGISTERED CANTON, O.



SUPERIOR

OPEN HEARTH STEEL SHEETS

WANTED

(By Us)

More and More Furnace Contractors to Know and Profit from Using Our

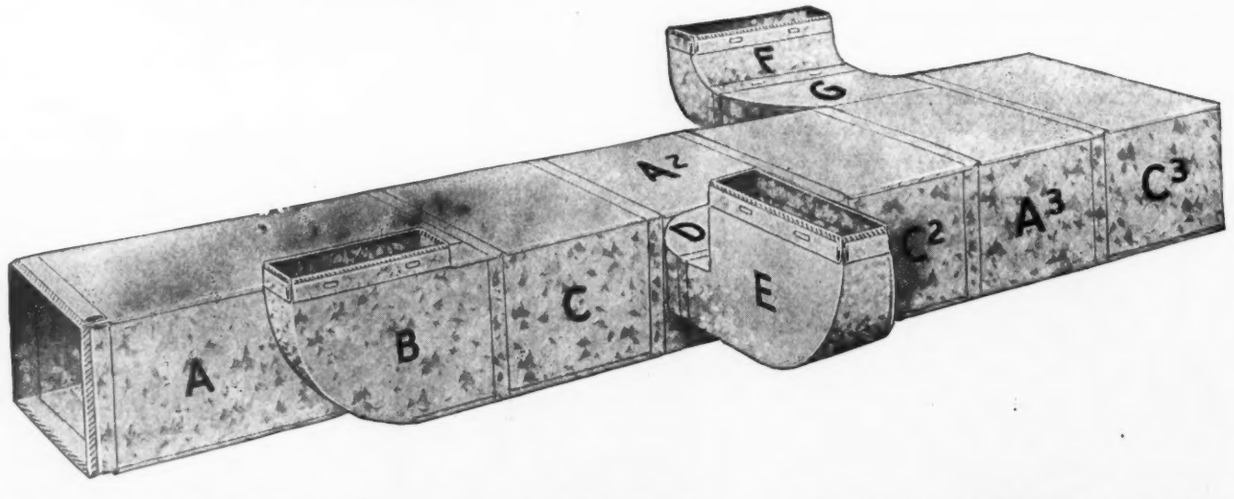
HANDY PIPE

WANTED

(By You)

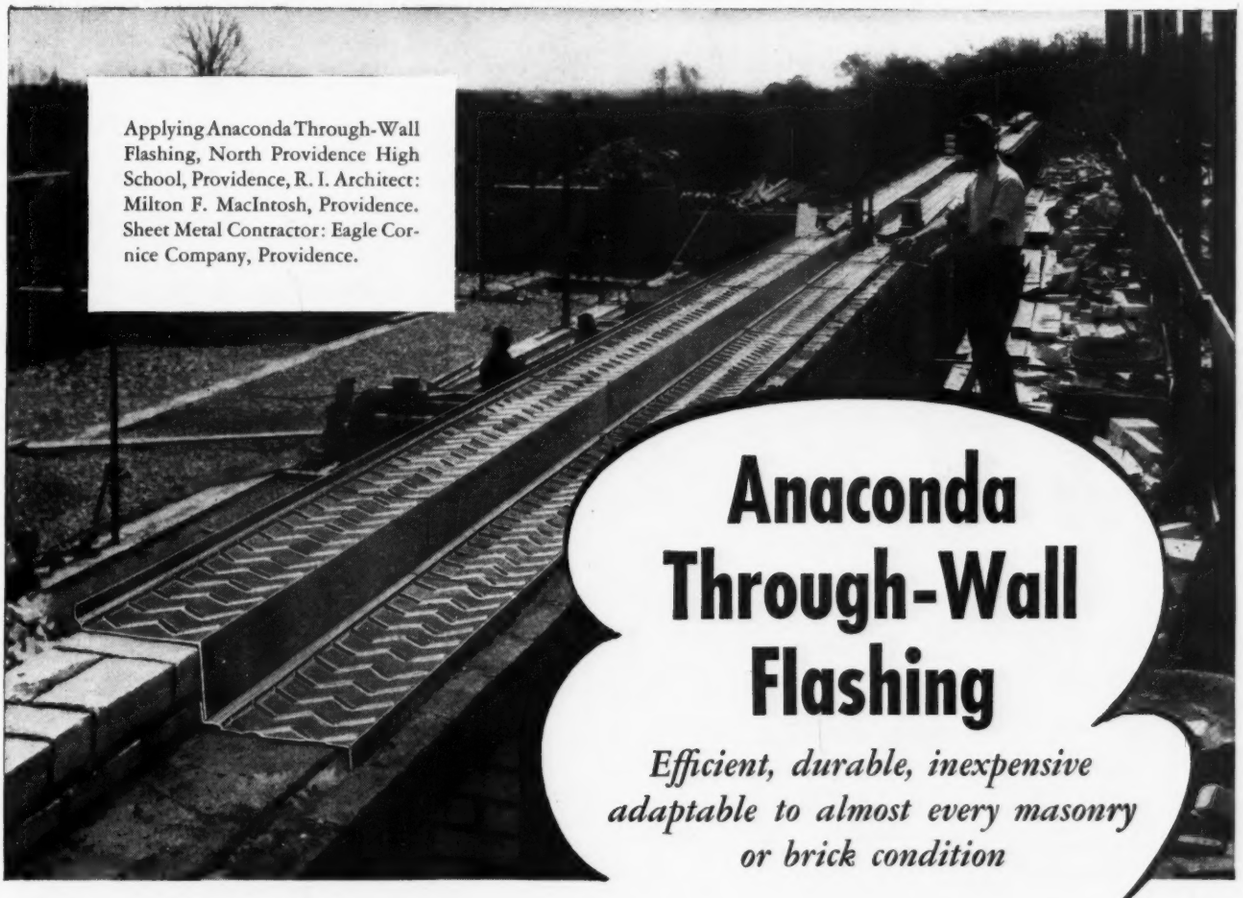
All the Benefits (Including Profit) from Handy Pipe's Tight-Fitting, Fast-Working "Regular" Pipe and Our New Pre-Fabricated Duct Work for Forced Air Jobs.

A Request for Our Catalogue and Duct Work Supplement Will Bring Us Together.



F. MEYER & BRO. COMPANY

PEORIA *"The Handy Pipe People"* ILLINOIS



Applying Anaconda Through-Wall Flashing, North Providence High School, Providence, R. I. Architect: Milton F. MacIntosh, Providence. Sheet Metal Contractor: Eagle Cornice Company, Providence.

Anaconda Through-Wall Flashing

Efficient, durable, inexpensive adaptable to almost every masonry or brick condition

Anaconda Through-Wall Flashing* has these worthwhile features:

1. Zig-zag corrugations, 7/32″ high, provide complete mortar bond in all lateral directions.

2. An integral die-stamped dam, also 7/32″ high, gives complete drainage in the desired direction. Flashing drains itself dry on a level bed, reducing possibility of wet walls and heaving by frost.

3. Flat selvage permits neat, sharp bends for counter-flashing or for locking to adjacent sheet metal.

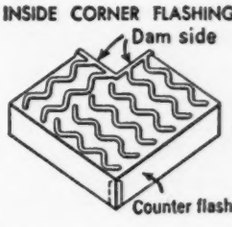
4. Through-Wall Flashing is easily locked endwise by nesting corrugations. Such joints are water-tight, but, if desired, are easily soldered because of adjoining flat surfaces.

5. Tongue of dam is so designed that it may be placed within 1/4″ of face of wall, protecting more of the wet portion of the wall, and still providing ample bed for efficient pointing with mortar.

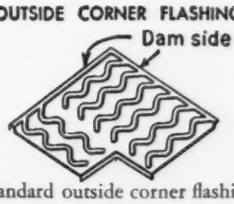
Anaconda Through-Wall Flashing, readily obtainable from Anaconda wholesalers, is made of 16-oz. copper—either plain or lead-coated. It is furnished in 5′ and 8′ lengths, in standard and special widths with various selvages, and corner flashing for 8″ and 12″ walls.

Anaconda Publication C-28 contains complete description of and suggested specification for Anaconda Through-Wall Flashing. 3987

*Patent No. 1,906,674



Standard inside corner flashing unit. Dam on inside; drains out.



Standard outside corner flashing unit. Dam on outside; drains in.

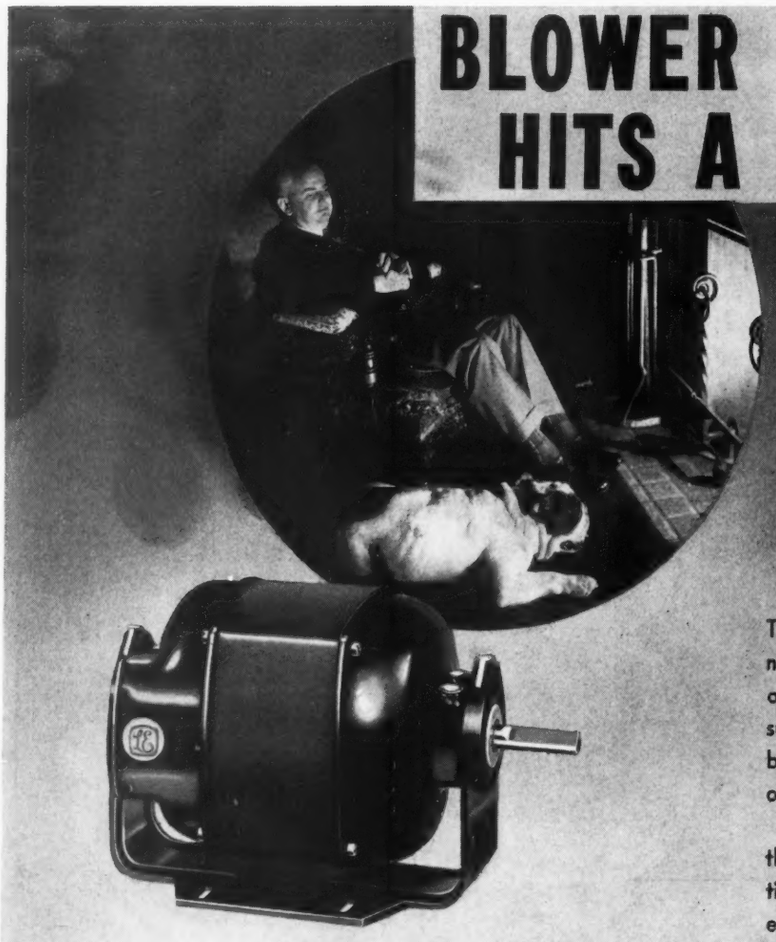
ANACONDA from mine to consumer

Anaconda Copper

THE AMERICAN BRASS COMPANY · GENERAL OFFICES: WATERBURY, CONNECTICUT

In Canada: Anaconda American Brass Ltd., New Toronto, Ont. • Subsidiary of Anaconda Copper Mining Company

BLOWER EFFICIENCY HITS A NEW HIGH



Sell the Extra Home Comfort Produced By Leland 2-speed Blower Motors

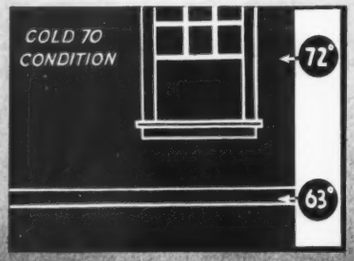
Two-speed blower operation ends the nuisance of "cold 70". 2-speed blower operation produces a more uniform heat supply . . . cuts down on "cycling". 2-speed blower operation provides nearly continuous air circulation...prevents "stagnation".

Because of these proven advantages, the trend in residential winter air conditioning is definitely toward 2-speed blowers. Take advantage of the demand for this type of installation by specifying Leland 2-speed blower motors . . . drives designed especially for this application . . . drives offering maximum power, quietness, and dependability.

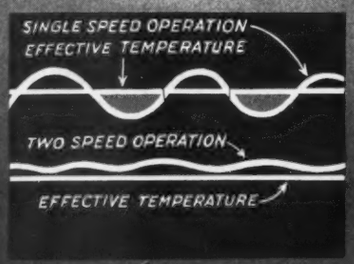
Leland 2-speed motors are available in either the split phase (illustrated above) or condenser start types . . . for use on 3 or 5 wire controls. For protection against possible burnouts due to overloading, the Leland thermomatic protector is recommended.

Get into this fast developing field. Begin by obtaining a Leland 2-speed motor for comparison and test. The Leland Electric Company, Dayton, Ohio.

More Than 200 Fully Equipped Service Stations



← During the off periods of single speed fan operation, the temperature differential between the floor and breathing levels often becomes so great a "cold 70" condition is created. Leland 2-speed blower motors help you end this source of dissatisfaction. They cut down on off periods and prevent wide temperature differentials.



← Single speed blower operation has an unsatisfactory "cycling" effect. Temperatures rise and fall, and in many cases, over-runs are created. Leland 2-speed blower motors aid in keeping room temperatures more constant. Heat flow is more uniform . . . air circulation is nearly continuous.

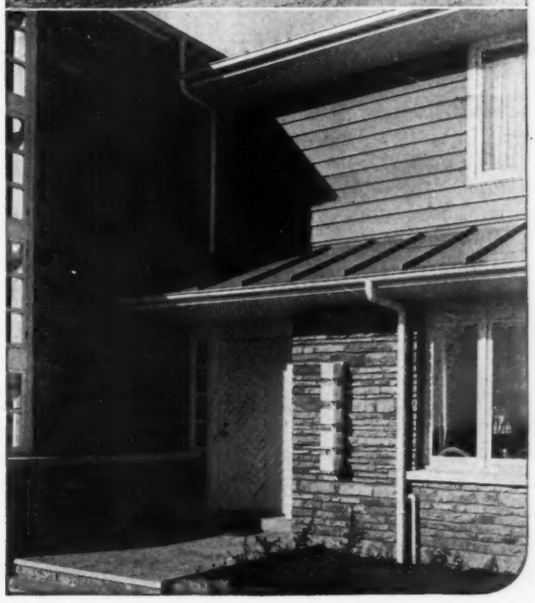
LELAND MOTORS TWO SPEED

All Three Said Armco PAINTGRIP

The Owner: Sheet metal work that could be painted immediately, and stay painted, was one of the real "musts" on our list. We didn't want its appearance spoiled by peeling, flaking paint; nor did we want frequent paint and repair bills.

The Architect: The owner's sheet metal demands were real posers, but we solved them perfectly by specifying galvanized ARMCO Ingot Iron PAINTGRIP. This unique metal took the paint smoothly, and promises to hold it a long time.

The Sheet Metal Contractor: My men and I have always enjoyed working ARMCO Ingot Iron, and we are tickled to report that in the PAINTGRIP finish it forms just the same. I am sold on this new sheet and plan to use it extensively.



● These days people expect full value for their sheet metal dollar. They want an attractive job that will last long and cost little to maintain. You can meet their demands readily with ARMCO PAINTGRIP, and make more money in the bargain.

This new sheet has a special bonderized surface that takes paint at once. No acid etching or weathering. Painters can follow you immediately and speed up the whole job. And because this special surface is neutral to paint, it preserves the essential oils that make paint last longer, look better.

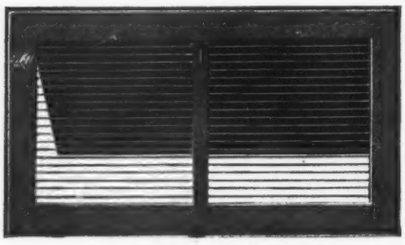
Remind architects and builders of ARMCO PAINTGRIP'S many advantages and see how it quickens sales and gives you the inside track on many a big-profit job. For prices and delivery information, call your nearby Armco distributor. The American Rolling Mill Company, 931 Curtis St., Middletown, O.

ARMCO

Armco

PAINTGRIP

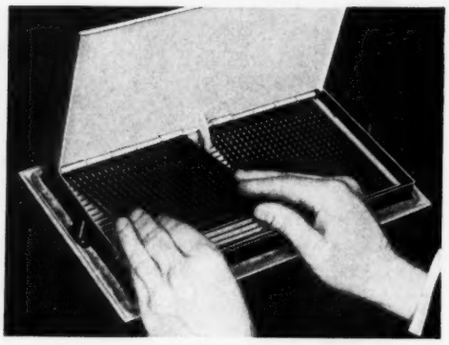
Why Pay Extra for *Every* Register Opening?



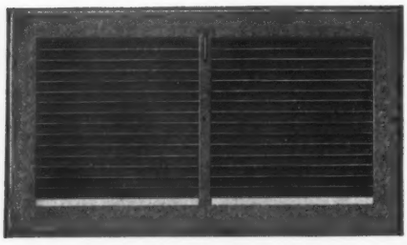
Style 153—This is typical of the U. S. close-space louver-type registers which come in straight, horizontal-flow or 22° and 45° down-flow and are also furnished in vertical flows, left and right, and multi-flow.

U. S. Louver-Type Registers inexpensively meet every requirement for directional-flow and soil-prevention.

Use with them, where side or multi-flow is required, the U. S. Inset Panels (shown at right) and you quickly convert to a multi-flow or right or left flow.

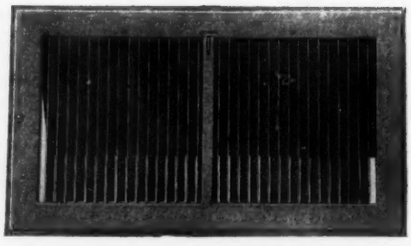


When You Need Up or Down Flow



Style 145—One-piece sidewall. Bars adjust to 60° up- or down-flow without marring register finish.

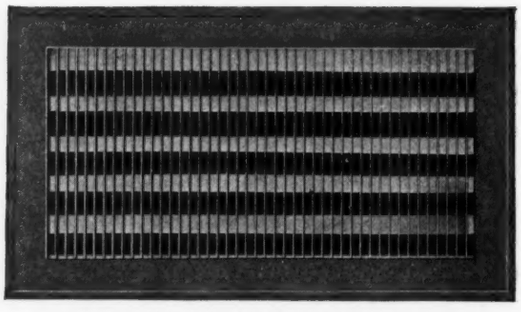
On jobs that need an adjustable bar register for summer cooling, these styles fulfill all requirements at reasonable cost. Style 145 is quickly and easily adjusted for 60° up-flow to 60° down-flow and may be adjusted a million times without injury to the register finish. This design can be equipped with U. S. Inset Panels and also give added side-flow feature. Rubber sealing gaskets are standard equipment.



Style 149—One-piece sidewall. Bars adjust to 45° right or left flow without marring register finish.

New Multi-Valve Air-Conditioning Registers

—that will deflect air currents from 45° down-flow to any desired angle in up-flow to a closed position. Truly a register to answer ALL purposes. Select your own type of face with this class of Multiple-Valve AC Registers. Also made with Horizontal and Vertical Bars and Deflector-Blades in opposite position from Bars in Grille Design. Refer to General Catalog No. 27, 1939 Edition, —Pages 117-118.



Lever Operated or Individually-Set Valves.

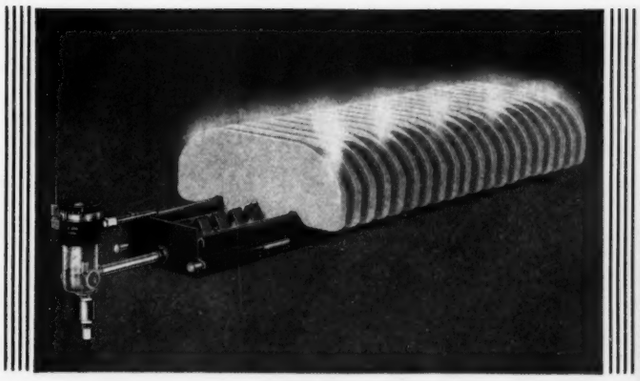
Keep Your Register costs down to Practical Levels that will still Protect Your Clients From Unclean Finished Installations and Prevent Soiled Ceilings. "An Ounce of Prevention is worth a Pound of Cure."

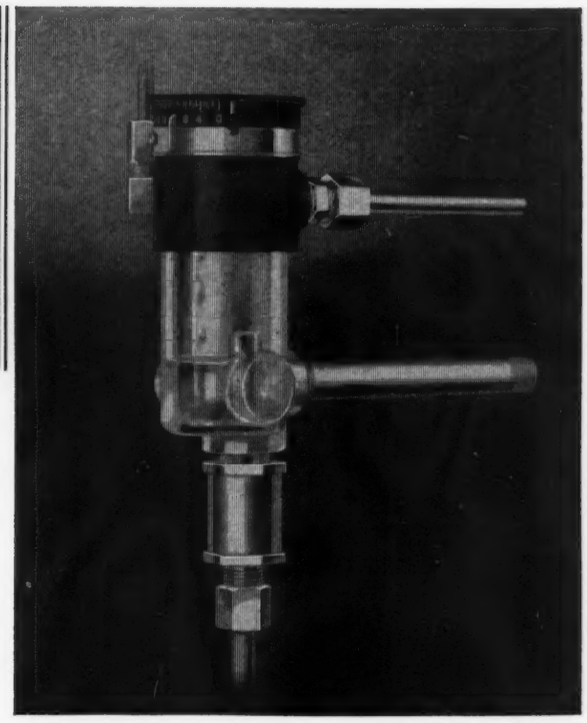
Lower Priced Lines for Low Priced Installations are included in our General Catalog No. 27 and Pocket Manual No. 27R.

UNITED STATES REGISTER CO.

BATTLE CREEK, MICHIGAN

MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.



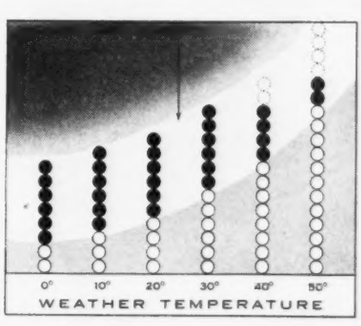


Precision Evaporation Plus Automatic Control

Monmouth's new automatic Humigrad Control brings new heights of efficiency to the famous Automatic June Vapor Diffuser.

It brings together for the first time *precision evaporation* and *automatic control.* This means weather-graduated humidity that is *always correct* regardless of outside temperature.

Humigrad Controls are the product of years of research. Although completely automatic they are simple in operation. The water, after passing through a filter and pressure governor, enters through the upper tube. The position of the calibrated dial wheel controls the rate of flow and the drip feed and water level can be plainly seen in the hermetically sealed transparent (plastic) cup.



To achieve proper humidification in *all* weather, the owner simply sets the feed at a rate suitable for *average* weather. The control does the rest. In no other way can the perfect humidification (shown in the chart) be obtained.

Complete information and prices will be gladly sent upon request.

MONMOUTH PRODUCTS CO.
General Offices and Factory
1933 E. 61st St.
CLEVELAND, OHIO

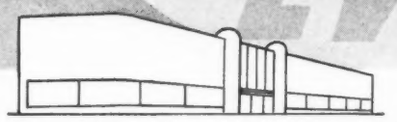
AUTOMATIC JUNE
GRADUATED HUMIDITY CONTROL

YOU WANT MORE BUSINESS?

Then concentrate your sales efforts on the metal that is in the Spotlight of Public Approval . . .

ENDURO

STAINLESS STEEL

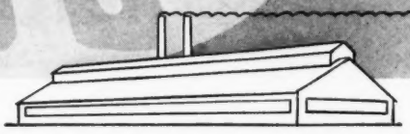


IN EVERY STORE

The uses for which you can sell ENDURO* Stainless Steel in stores are many and varied. Store fronts alone have accounted for hundreds of tons of this beautifully-brilliant metal in the last few years. Artistic stairway trim is another field worth cultivating, especially in specialty shops. Window decorations and signs help lure customers. Showcase trim and decoration, novel lighting fitments, kick plates on doors, tops for work tables and counters, grilles for heating systems and cashiers' desks—all offer opportunities for you to sell the products of your craftsmen at a profit.

IN EVERY HOSPITAL

Sanitation, cleanliness, ease of cleaning, negligible wear and low depreciation—these are the words that strike a responsive chord when you talk to hospital management—and ENDURO is the stainless steel that meets their needs. Some of the many hospital uses for which you can fabricate ENDURO include table tops, sinks and drainboards, racks and shelving, ducts and hoods, baking equipment, cabinets, kick plates, laboratory equipment, and tanks. Remember, this is not only a steady market for the products of your shop—but also a willing one because of its specific needs.

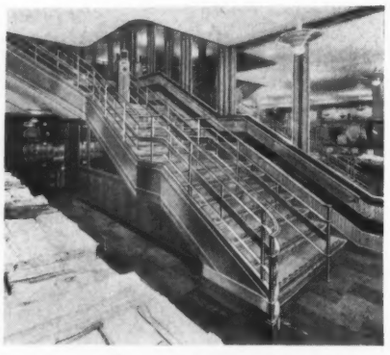


IN EVERY FACTORY

Factories buy many items made of stainless steel for which ENDURO is a "natural." Here utility, not beauty, is the selling argument, and utility means resistance to corrosion and high temperatures. Among the items you can produce might be mentioned furnace parts, open and closed tanks, work tables, annealing boxes, laboratory equipment, experimental apparatus, dust-collecting equipment, parts for blowers and ducts operating at high temperatures. And don't overlook the fact that somewhere in the wide variety of ENDURO analyses there is one that will best suit every set of operating requirements.

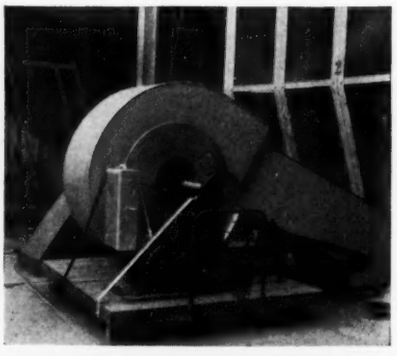
REPUBLIC STEEL CORPORATION

General Offices: Cleveland, Ohio • *Alloy Steel Division:* Massillon, Ohio



Sheets and bars of ENDURO Stainless Steel used for stair railing and trim in the most attractive chain store in the East.

Typical of the type of hospital equipment for which ENDURO is ideal.



ENDURO ducts carry air heated to 1400 degrees and materially reduce operating costs in this Eastern brick plant.

REG. U. S. PAT. OFF.

REPUBLIC STEEL

*Reg. U. S. Pat. Off.

Republic makes a complete line of black, galvannealed and galvanized sheets of steel and rust-resisting Toncan Copper Molybdenum Iron. Also Taylor roofing ternes.

BERGER MANUFACTURING DIVISION
NILES STEEL PRODUCTS DIVISION • TRUSCON STEEL CO.
UNION DRAWN STEEL DIVISION • STEEL AND TUBES, INC.

A very practical booklet telling how to fabricate stainless steel will be sent to you upon request.

AMERICAN ARTISAN

Volume 108 Number 4

Specifications For Gas Furnace Installation

AMONG the articles in this issue is one dealing with "suggested" or minimum specifications to cover the design and installation of gas-fired heating systems in residences. These specifications were set up by a number of gas utility companies who have found that gas as a fuel is getting a black eye because the heating systems installed violated many of the principles which the warm air heating industry has established as absolutely essential.

Much the same situation exists among the other fuels—oil, coal—and among other types of heating—steam and hot water.

As the author of the article so aptly points out, the basic cause of this situation is greed—greed for business by manufacturers who are not satisfied to sell through established channels of distribution and who, in their haste to get volume, are willing to sell units to anyone with the cash to buy and to leave to the buyer the responsibility of getting the equipment properly installed.

And greed for business among contractors who see first of all volume and secondarily (if at all) profit.

It is true that contractors specializing in new house work—particularly speculative house work in quantities—are up against a tough problem. The price they can hope to get is nothing to brag about with only themselves bidding, but, when two or three more hungry contractors get in on the bidding, things happen. Usually the first thing to happen is a big slash in prices. If the builder is a "smart" operator the prices begin to spiral downward in a dizzy whirl. The contractor who survives may get his costs, overhead and salary out of the job, but very often gets costs only without overhead and salary.

It is silly for anyone to suggest that this procedure is all wrong. America has been built on "most value for the least money" and as consumers we all know that he who gives value gets the business. True, value is often confused with price, but only the buyer can decide for himself where "value is worth the price" or where "price is more essential than value."

No small part of this "American system" of ours; this high standard of living we hear so much about; has been contributed by the building industry which, since America began, has been giving its profits to the buyer in exchange for dubious recognition as a "big shot contractor."

The only solution if, indeed, there can be any solution (humans, and contractors, being what they are) is a code of minimum standards below which, it is acknowledged, an industry cannot go without endangering the lives, property and health of those who buy that industry's services.

That such endangerment actually exists within this warm air heating and warm air, air conditioning industry, few will deny. The proof of the hazardous lengths to which the industry will go is evident in every community where any quantity of houses have been built by speculative builders during the last three years. That other forms of heating (steam and hot water) will go as far or even farther is also evident in every community.

What the heating industry must do—and this applies equally to radiator heating—is to curb the speculative builder before it is too late. We should not permit any such group as the speculative builders to set our standards of design and installation, particularly when history shows these builders, too often, think only of their down payment.

For those heating contractors and speculative builders who give real value for the money, we have hearty respect—but for those speculative builders who deliberately risk public safety and health and comfort "for a price" and for the heating contractors who knowingly lend themselves to this deception there should be legal —not moral—condemnation.

For this we have codes—admittedly as full of shortcomings as all other things we humans try to do—drawn and made law not to keep men out of business, but to set a foundation under construction and design below which we cannot go without endangering our customers and, secondly, to establish a barrier to the depredations of those who would build too cheaply.

The unscrupulous speculative builder, if uncurbed, can destroy our industry.

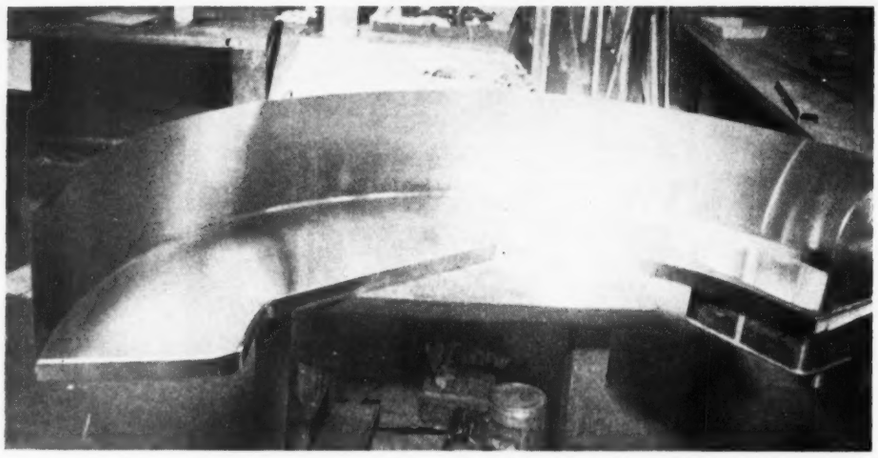


Fig. 1—Curved back-bar and sink of stainless steel designed for a home bar. The high splash board is moulded to fit the bar top.

By A. B. Laing

Specialty Items from a California Shop

FROM time to time during the past few years some of the specialty items fabricated by the Crescent Sheet Metal Works, Los Angeles, have been pictured on these pages. This shop, unusually prolific of ideas which can be translated into sheet metal has recently produced the items shown here—items of commonplace fabrication and items most unusual.

Like air conditioning, the provision of facilities for serving drinks in the home has become one of America's profitable industries. And like many other alert metal-workers, Crescent is busily trying to catch up with the demand for private bars of many standard and special forms. Generally bar business is nice business. Materials are carefully selected of premium material but so far as Crescent is concerned stainless steel is preferred because:

(1) It is most fashionable.

(2) It is 100% rust and alcohol proof.

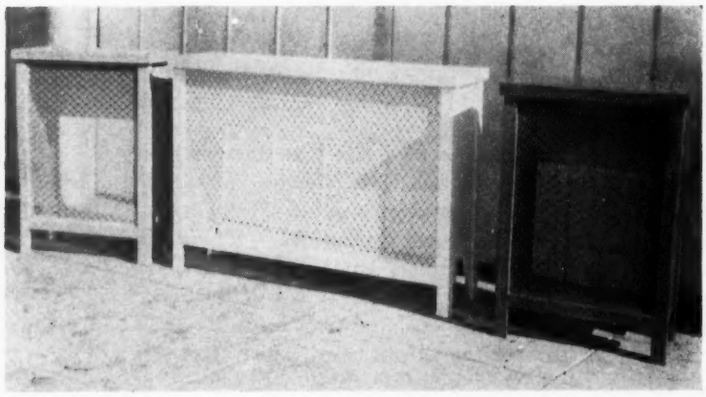
(3) It requires only an inch or two of framing depth, making for space-saving in an era of small homes and apartments where every foot counts.

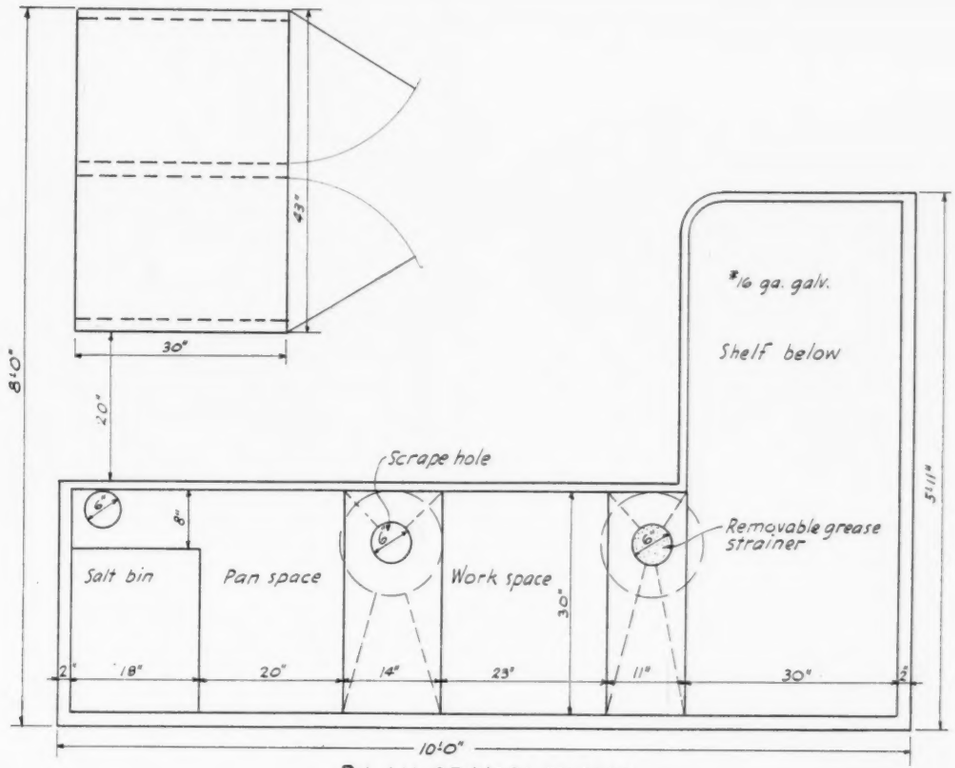
How a smart, modern-appearing bar may be tucked into a small available room is illustrated from the shop photo (Fig. 1). Just polished, this semi-circular, "corner-type" bar is ready to be trucked to the job. The photograph shows how the splash board of metal is formed integral with the counter top, providing a screen from the occupants of the room and a pleasant and comfortable rest for the elbow. For those who like to balance on one foot while downing their drink, Crescent finishes off their bars with a neat little copper rail. Just stock tubing—capped with a casting at each end and supported on cast bronze brackets, 2′ o. c.

Perhaps the oddest example of metal fabrication to come from the Crescent shop is the Fig. 3. Actually, this is a pair of chimney pots, designed for an "old English" residence. Of galvanized iron with welded joints, the metal is stamped to represent plastered brick at the point where the chimney supposedly tops out. Rising from this massive looking brick base the two flues, of heavier stock, are formed, soldered, and ornamented (all in galvanized iron) and when placed on the house defies detection.

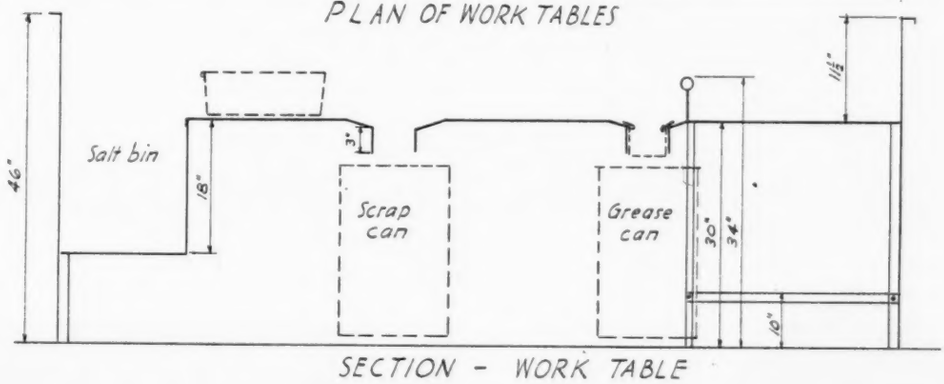
One of southern California's newest eating places is Lawry's, a cafe and cuisine patterned after a famous eatery on London's Strand, and serving only roasts, all of them oversize and all cooked under a six-inch layer of rock salt.

Fig. 3—Left—Galvanized iron chimney tops of ingenious design and undetectable from the street. Below, standard radiator enclosures.

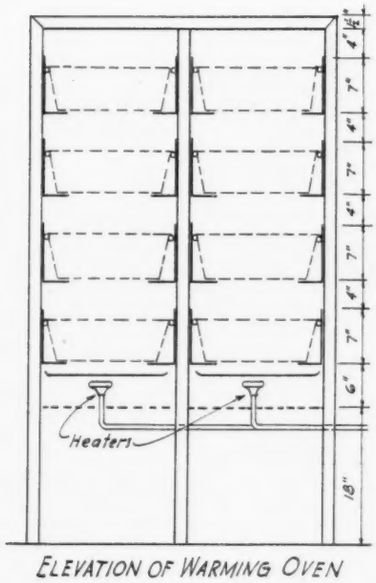




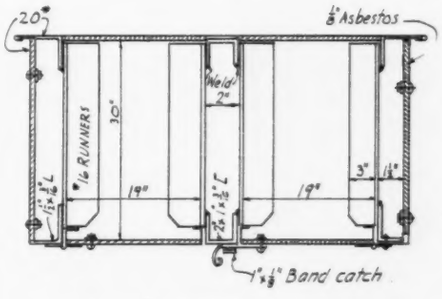
PLAN OF WORK TABLES



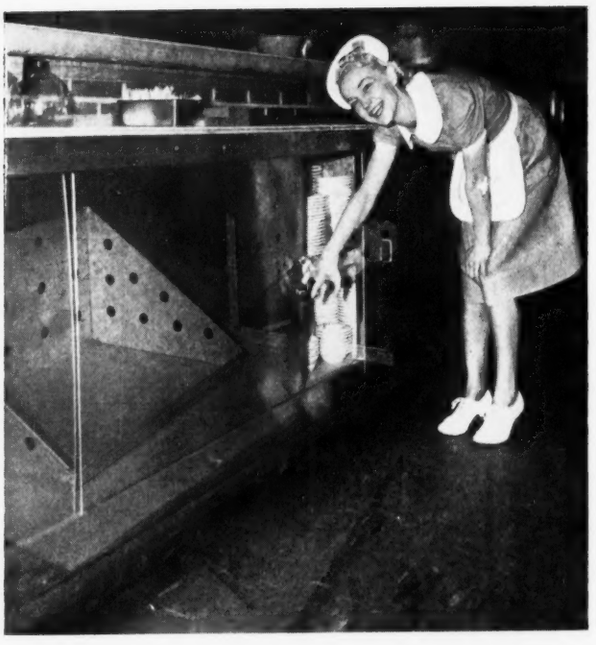
SECTION - WORK TABLE



ELEVATION OF WARMING OVEN



PLAN OF WARMING OVEN



Above—Exterior of Sawry's showing special windows. Right—Waitress closing mirror polish stainless steel doors of a specially-built, dish cabinet in Sawrys.

Maybe the epicure's enjoyment is enhanced by this new culinary trick, but the sheet metal worker's problem is complicated because of the large quantities of the pickling strata which must be handled and re-handled by the chefs—a chemical, saturated with meat juices, and superheated to 450 degrees.

Sides of beef cooked in this manner, are wheeled to the diners' tables in special joint wagons like the one illustrated (supplied by Dohrman Hotel Supply Co., San Francisco). A waiter carves the portion selected before the customer's eyes and then ladles out the gravy and vegetables as desired.

Special stoves large enough to accommodate nine hindquarters at one time had to be constructed to special order. Pans had to be constructed to withstand a temperature of 450° and Manager Levy of the cafe specified that the loaded pans must slide easily in and out—whether cold or hot.

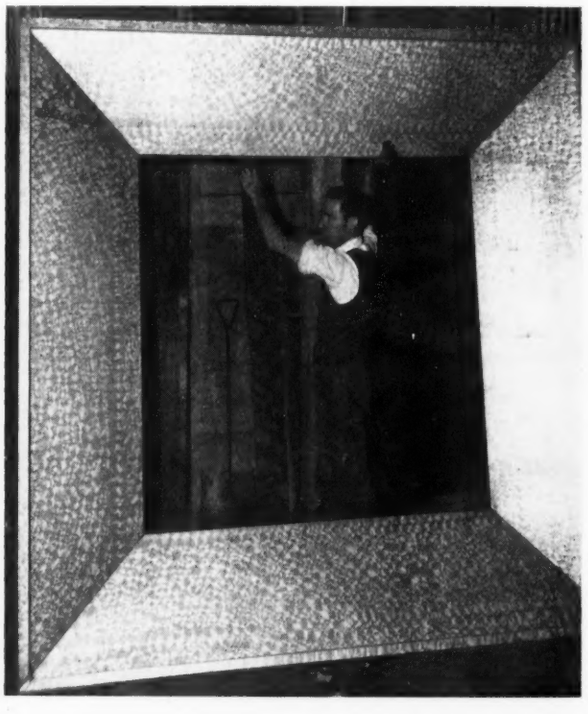
After the initial cooking operation in the high temperature stove, joints are removed to the worktables, a portion of the salt is scraped off and the pans are popped into a second oven to remain for a specified time at 125 degrees.

How all these requirements were fulfilled in stainless steel on angle framing using welding, is shown in the accompanying drawings. The sketches reproduced are the layout drawings from which Manager Vandebusch landed the job.

The small shop drawing subsequently made shows how ovens were finally constructed. 20-gauge stainless steel with ¼-inch asbestos insulation over angle iron frame, arc welded with joints riveted and locked. Runners for the sliding pans are 16 gauge stainless.

Extra wide work tables of stainless steel were provided for the chefs wherever space permitted. The complete work table layout with salt bin, grease and refuse cans all sized for installation within given floor spaces is shown in the sketch on preceding page.

Left — Stainless steel "joint wagon made by Dohrman Hotel Supply Co., San Francisco, for Sawrys.



Right — Stove hood of 24-ga. galvanized iron with inside "drip" ledge, soldered joints and standing seams.

"Stovepipe Man" Identifies Nielsen's

"METAL MEN" used as advertisements for sheet metal and furnace shops are always a novelty —they have been constructed of odds and ends or of very carefully thought out materials for many years yet, despite this commonplaceness, new ones appear year after year and contractors continually ask how to build such a "metal man."

The latest "metal man" to come to our attention is shown in the photograph. He was built by and is used to advertise the Nielsen Heating Company of Davenport, Iowa, F. W. Winter is owner-manager of the firm and he relates how "Davenport's Stovepipe Man" first got into the news by appearing in the rotogravure section of the Des Moines Register-Tribune.

Mr. Winter believes that his "metal man" has very definite advertising value and since breaking into print has caused some legal difficulty and also has become a tie-in with the heating company. Relates Mr. Winter:

"We think our stove pipe man is of some advertising value. Since his picture was in the paper we have had one party in to get the legal matter straightened up, and have also had quite a few people mention seeing our "metal man" in the paper and immediately connected him with our shop.

"Relative to the legal battle, the people, in passing by, shook hands with him and in many cases left his arms protruding outward so as to cause a hazard. The city authorities said it was illegal to have anything on the sidewalk, but by lots of pleading and by proving that he is on our property, inasmuch as he is secured to the post in back of him and that one of the buildings down the street was closer to the curb than our building, the officials finally agreed that if we tied down the arms so that they could not stick in the air, we could leave him in place. We, of course, bring him in at night.

"We might also add that some of the social elite here, having a big wedding, requested the presence of our metal man. We also loaned them a larger model that we have. This, of course, was a good advertising stunt, as everyone wanted to know where they got the metal man. Quite frequently we look out the window and see cars stop and look him over. In calling on the people through the city, if they don't seem to place our shop, we mention our metal man whom they immediately remember. This man has also been at our Better Homes Show and has been put through maneuvers, such as smoking. He is made of all galvanized iron with the exception of his tie which is hard copper. His ears are also of hard copper."

The Revised Gravity and Mechanical Warm Air Heating Code of Toledo, Ohio

In the March issue we published part I of the revised ordinance which includes mechanical warm air heating in addition to the original gravity regulations. The present ordinance is a completely revised edition—contains no tricky technical provisions, seems to be plainly worded and, in addition to design regulations effecting only the contractor, contains additional regulations which protect the home owner.

Minimum Requirements for Estimating Heat Required for Warming Buildings

Section 214. The method which shall be used in computing the minimum amount of heat in British Thermal Units (B. T. U.) per hour, which must be supplied to or generated within any building to maintain the inside temperature hereinafter stipulated, with the outside temperature and wind movement assumed as provided in these rules, shall be as follows and shall apply to all types of heating systems: The inside temperature shall be measured at a height of three feet (3'-0") above the floor level and not less than three (3) feet from any outer exposed wall. The procedure which shall be followed for estimating the heat required for warming buildings shall be as follows:

(A) The inside air temperatures, at the three-foot level, which is to be maintained in a residence shall be 70° F. minimum.

(B) The outside air temperature which shall be used for design purposes shall be taken at zero (0°) degrees Fahrenheit.

(C) Select from authorized tables, or secure from the Division of Inspection, the heat transmission coefficients for outside wall and glass, also for any floor, wall or ceiling next to unheated space and any portion of roof next to heated space.

(D) Measure net outside wall, glass and roof next to heated spaces, as well as any cold floor, wall or ceiling next to unheated space. Such measurements shall be made from the building plans submitted to the Division of Inspection by the heating contractor. Should it subsequently develop that said plans so submitted are inaccurate in any essential detail, it shall be the duty of the heating contractor, upon being notified so to do by the Inspector, to make such changes in the heating installation as may be necessary to correct any resulting discrepancy therein, and to bring same into conformity with the requirements of these rules.

(E) Compute the heat transmission losses for each kind of wall, glass, floor, ceiling and roof in the building by multiplying the heat transmission coefficient in each case by the area of the surface in square feet and then by the temperature difference between the inside and outside air.

(F) Select unit values and compute the heat equivalent of the infiltration of air around outside doors and windows. Said unit values shall depend upon kind and width of crack, with wind velocity assumed at fifteen (15) miles per hour, and when multiplied by the length of crack, and then by the temperature difference between the inside and outside air, the result shall be taken to be the heat required to warm the cold air leaking into the building per hour. Provided, however, that the air change method may be used in lieu of the above method for computing heat losses by infiltration, if desired.

(G) The sum of the heat losses by transmission (Item E) through the outside wall and glass, as well as through any cold floors, ceilings or roof, and the heat equivalent (Item F) of the cold air entering by infiltration or introduced mechanically, shall be taken as the total heat required for maintaining the required inside temperature in the building.

Section 215. Non-mechanical warm air systems, depending on the displacement of warm air with cold air by gravity, for the motive power for the circulation of air through the system shall not employ overhead duct work or overhead heat openings, unless a drum or plenum of proper design and capacity, properly connected to furnace, is installed in attic space over rooms to be heated, and heating ducts run from same.

Section 216. Before a permit shall be issued by the Commissioner of Inspection for the installation of any warm air heater, or, for any device performing some specific service in connection with any warm air heating system, the contractor installing such heater or device, or the manufacturer of same, shall furnish said Commissioner with such test data, measurements, ratings, capacities, or other information as may be required.

Gravity Warm Air Heating Definitions

Section 301. The following definitions shall govern the meaning of the several terms and expressions so defined, wherever said terms and expressions are employed in these rules:

(A) A warm air furnace shall consist of a direct fired heater, over the exterior surface of which the air passes, to be directly heated by the radiant heat of combustion and to which shall be connected a system of ducts or pipes for the conveyance of air.

(B) A gravity warm air heating system shall consist of one or more warm air furnaces, enclosed within casings, together with necessary appurtenances thereto, consisting of warm air pipes and fittings, cold air or recirculating pipes, ducts, boxes, and fittings, smoke pipes and fittings, dampers, registers, borders, faces and grilles, the same being intended for heating the buildings in which they may be installed.

Warm Air Leader Pipes and Stacks, Sizes of

Section 302. In connection with any gravity warm air heating plant in any building, no warm air leader pipes or wall stacks shall hereafter be installed of sizes less than those determined in the following manner.

Section 302-A. Determine the heat loss in B. T. U., for room to be heated, then

Leader Pipe area first floor room, sq. ins. = H ÷ 111
Leader Pipe area second floor room, sq. ins. = H ÷ 166
Leader Pipe area third floor room, sq. ins. = H ÷ 200
Where H—heat loss in B. T. U. of room to be heated.

Section 303. The above formulas are applicable to straight leaders not exceeding twelve (12) feet in length. Where

warm air leaders exceed twelve (12) feet in length or have more than two (2) 90° turns, exclusive of elbow at boot, a pipe at least one commercial size larger shall be used.

Wall Stacks, First Floor Rooms

Section 303-A. All first floor fittings and connections shall maintain a free area equal to the round basement pipes leading to them.

Wall Stacks, Second and Third Floor Rooms

Section 303-B. Area to be not less than seventy (70%) per cent of calculated basement pipe area as determined in Sub-Section 302-A.

Section 304. Where two (2) or more rooms on the same floor are heated from the same basement pipe and stack, the area of such basement pipe and stack shall equal the combined required areas for such rooms, as determined in Sub-Sections 302-A, and 303-B.

Section 305. Transition from warm air pipes to stacks or register heads shall be made with a well designed elbow or boot.

Size of Registers

Section 306. All registers shall have a free area at least equal to the area of the basement pipes leading to them. They shall be fully as wide as the stacks or fittings to which they are attached.

Size of Furnace

Section 307-A. Add together the leader pipe areas necessary for heating the building, in square inches as determined by the calculated requirements set forth in Section 302-A, and install a furnace by the following formula: Allow 1.75 square inches of warm air pipe area for each square inch of grate area for a furnace having a ratio of heating surface to grate of 20 to 1. For furnaces having other ratios, add two (2) per cent for each unit by which such ratio exceeds 20 to 1, and deduct two (2) per cent for each unit by which it is less than 20 to 1. In no case shall the size of furnace be less than 25% in excess of heat loss requirement of building.

Section 307-B. The register temperature must be determined before system is designed. One hundred seventy-five (175° F.) degrees Fahrenheit maximum at register is approved for designing purposes. The leader pipe and stack size must be of ample capacity to equal the heat loss requirements of building to be heated. (Sec. 2).

Limitations of Rating Formula

Section 308. In all cases where the foregoing rating formula is not applicable, because of special construction or devices, the manufacturer's rating, approved by proper authorities, must be presented. If this is not available, the Division of Inspection shall determine the proper rating in accordance with the best engineering practice.

Certified Ratings Lacking Capacities Determined How

Section 309. Where certified ratings of warm air furnaces, by the manufacturers thereof, in accordance with the above formula are not filed with the Division of Inspection as required hereby, then the capacity of such furnaces shall be determined by multiplying the square inches of grate area by 1.5.

Gas or Oil Fired Furnaces

Section 310. In the application of any gas or oil fired furnace to any gravity warm air heating system, deviations from the requirements of this ordinance shall be allowed only in connection with the furnace itself and shall be subject to the approval of the Division of Inspection. The rating of each such gas or oil fired furnace shall be determined by its manufacturer and certified by the proper authorities or by the Division of Inspection in accordance with the best engineering practise.

Furnaces, Construction, and Installation of

Section 401. The construction and installation of all warm air furnaces hereafter, installed in connection with gravity warm air heating plants in the City of Toledo shall comply with the following requirements:

Location of

Section 402. The location of the furnace shall be such as to equalize the length of all warm air pipes as far as possible, yet give necessary preference to pipes supplying rooms having unusual requirements. (Sec. 2).

Foundations or Other Supports For

Section 403. Furnace foundation of brick, cement, or other like incombustible material shall be provided. Said foundation shall extend at least twelve (12) inches at rear and sides of furnace casing and at least twenty-four (24) inches in front of furnace casing. Foundation shall be level. (Section 2).

Section 403-A. When a furnace is installed on combustible floor, it shall have a protective base of sheet metal, or asbestos covering, with hollow masonry not less than four (4) inches in thickness, laid to preserve a free circulation of air in such masonry course from side to side. Such base shall extend at least twelve (12) inches beyond the furnace casing at rear and sides, and at least twenty-four (24) inches at front of furnace. (Sec. 2).

Setting or Assembling of Furnace

Section 404. The base ring of any warm air furnace shall be cemented to the foundation, and cement flushed in around the back of the base ring, making an air tight joint. The furnace parts shall be assembled plumb and level and in a workmanlike manner.

All sections and joints shall be properly fitted. Joints requiring cement shall be well filled and all bolts shall be drawn up tightly. (Sec. 2).

Casings

Section 405-A. Warm air furnaces shall be enclosed in metal casings or walls of brick, tile, or concrete. (Sec. 2).

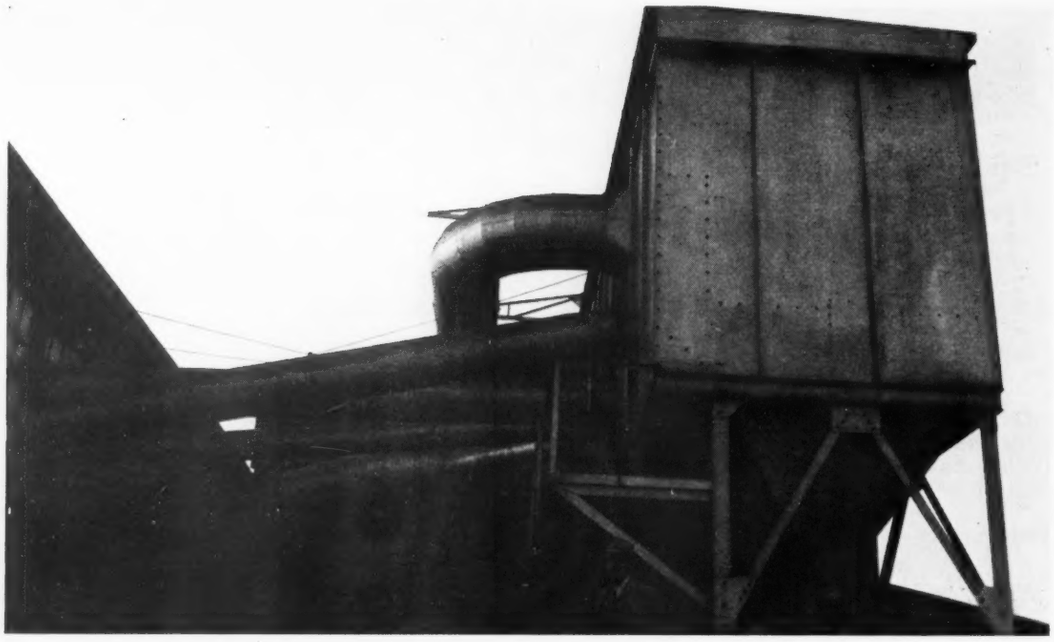
Section 405-B. Portable sheet metal casings, including tops or bonnets shall be made of galvanized sheets not lighter than No. 26 U. S. Standard gauge. They shall fit the casing rings closely; they shall be dust tight, and shall be securely fastened to the front. The casing shall be lined with sheet metal from the upper casing ring down to a line level with the grate. The air space between liner and casing shall not be less than one inch. (Sec 2).

Section 405-C. When side collars are used, the top or bonnet shall be of sufficient height that the largest warm air pipe can be taken from the side without ovaling.

Section 405-D. Any furnace, the casing top of which shall come to within eighteen (18) inches of a combustible floor, ceiling, or joist, shall be protected by a metal shield, extending not less than six (6) inches beyond the casing of said furnace. This shield shall be suspended at least two (2) inches below woodwork, allowing free air space between shield and woodwork. No furnace casing or top, coming within less than eight (8) inches of ceiling or joist shall be allowed in any case. All metal casing tops shall be insulated with not less than four (4) inches of magnesia, rockwool, or equivalent. (Sec. 2).

Section 405-E. Openings for side casing collars shall be cut so that the top of all openings are on the same level. Casing collars shall be fitted into place with a proper flange, or bead, on the outside and drawn up on the inside, making a dust tight joint. All collars shall be of the same size as the warm air pipes to which they are to be connected.

[To be continued]



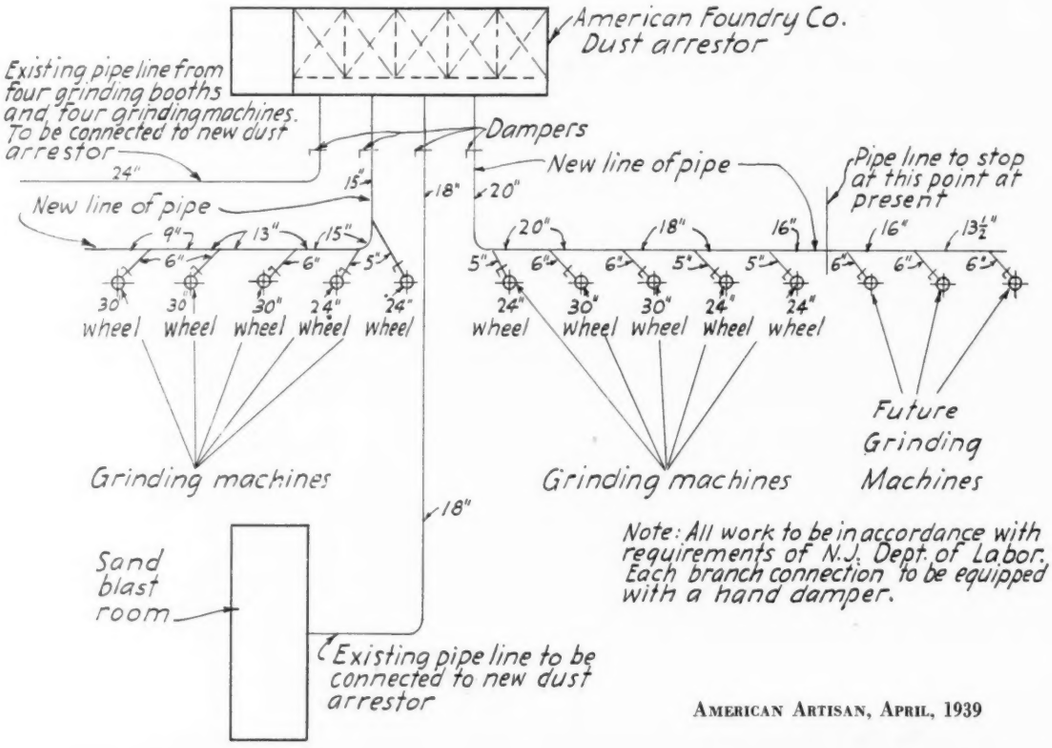
By
R. C. Nason

An Abrasive Grit Collector System

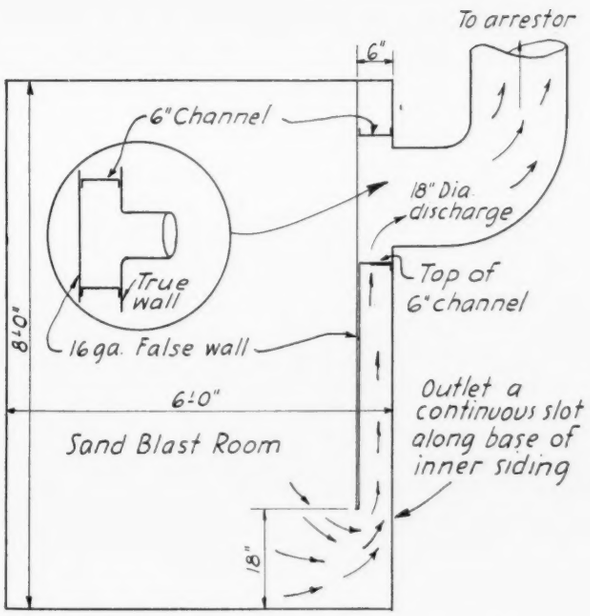
AS A SAFEGUARD to public health and for the machine operators concerned, R. F. Stengel & Sons, sheet metal contractors of Irvington, N. J., recently fabricated and installed an effective mechanical exhaust system and collector in the plant of the American Abrasives Metals Co., Irvington, to handle grit and metal dust. The manufacturer in this case processes metal stair treads wherein abrasives such as carborundum are cast with brass and iron in some designs and abrasives inlaid as non-slip panels in other instances.

Typical of most castings, fins and burrs of metal have to be chiselled off before edges and like parts can be smooth ground in another department and before the finished work is suitable for shipment. Material salvage is of less importance here than the public hazard experienced when wastage was discharged into the atmosphere.

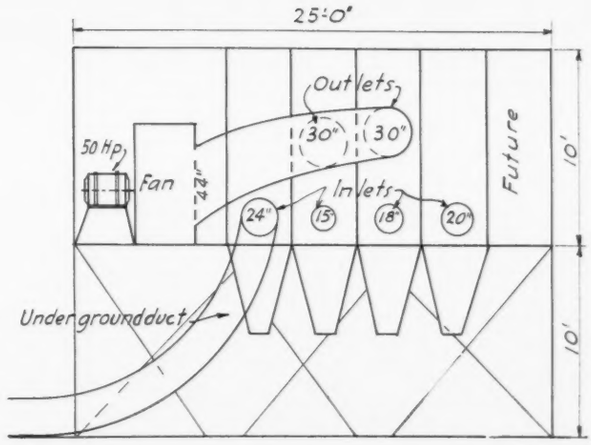
In the initial exhaust system installed in this plant several years ago, sheet metal cyclone separators were employed. Three units were set into angle iron cages behind the plant. Due to the adhesive tendencies of the



Above—General view of the housed collector with connecting piping. Right—General layout of the plant showing arrangement of grinding wheels and collecting system. Also sand blast room requiring a separate line. See other sketches for details equipment and system.



Elevation of sand blast room treatment in N.J. Metal and Abrasives Plant.



Dust arrestor of four cells as installed by R.F. Stengel & Son, Irvington, N.J. To handle metal and abrasive dusts.

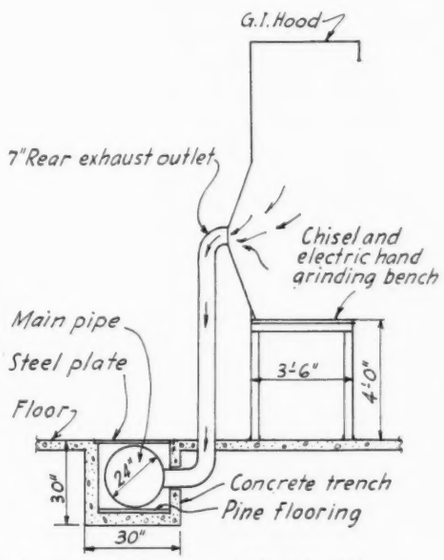
Left—Construction of sand blast room showing false back wall with inter-wall space which serves as an air collector leading into the discharge pipe. Above—Arrangement of cells in collector showing underground pipe from grinding booths.

light dust, the efficiency of this type of collector rapidly diminished with use, while the severity of the abrasive action of the waste on the sheet steel of which the collectors were made wore holes in them at critical points within three years of their installation.

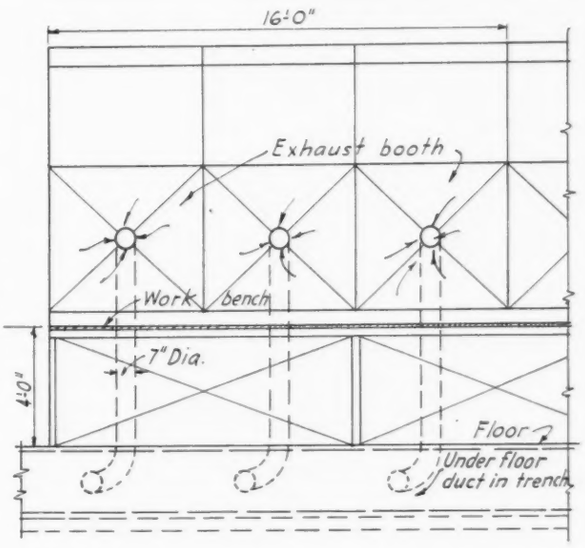
To bring the equipment up to date, a rectangular, sectional type of dust collector, designed by the American Foundry Co., was selected. Some of the existing piping within the plant proved good enough to retain. Other parts were renewed and still other parts necessitated the fabrication of new mains and branches by the sheet metal contractor. This type of collector employs fabric tubes as shown in one of the sketches. Entering air loses velocity as it strikes the baffle; large particles fall immediately into the hopper; lighter particles and dust carry up into the fabric tubes where all dust is filtered out. The very slow air velocity through the fabric tubes eliminates caking. A special mechanism is included which, when the dust loading indicator operates, shuts down the fan and mechanically shakes the tubes. For installations which cannot be shut down, the sections of the unit are shut down one by one and after cleaning cycled back into the system. The fabric used is selected according to the type of dust handled.

Tracing a few of the interesting features of the new sheet metal work, let it be explained that in one finishing operation the tread castings have to be provided with crisscross, indented lines, this to prevent slipping when in service. To enhance the sharpness of the lines, electric chisels are applied. The operations are

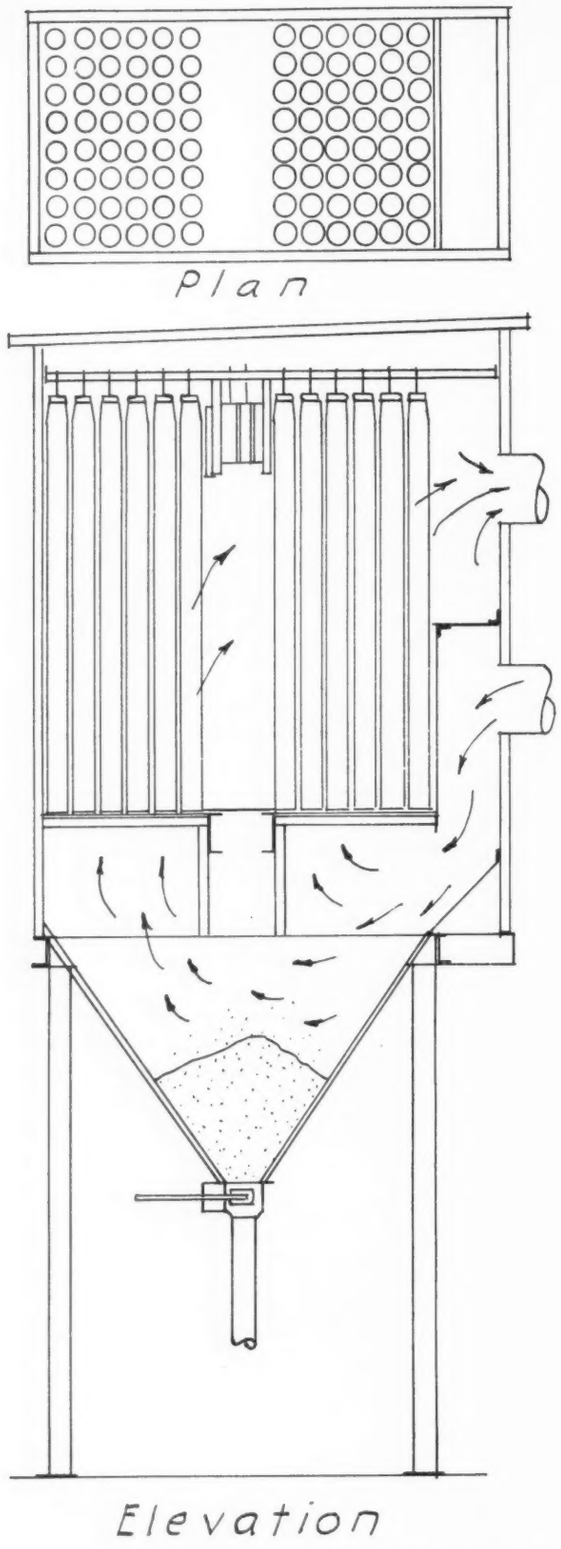
Front view and side view of one group of grinding wheel booths with rear outlet and pipe drops to under-floor main to collector.



Side elevation of work bench with rear exhaust outlets to underfloor main in trench for handling abrasives and metal dust in stair tread



Front elevation of one of 3 exhaust booths wherein workers hand grind and chisel metal stair treads.



Plan and elevation of collector showing fabric bags which collect the grit. A mechanism periodically shakes the bags to empty the grit into the hopper.

conducted in triple-hood booth 16 feet long, each booth divided into three rear, side hoods. Each separate hood has a 7-inch outlet that joins an underground main 18 inches in diameter. There are three such booths, thus making twenty-seven 7-inch openings.

Placement of the 24-inch main in a concrete trench 30 inches square was done to afford more daylight to grinding operators, plus the added advantages of preventing denting of the sheet metal had it been run along the floor. Steel plates on top of the trench permit walking and wheeling over it. The duct continues trenched through an outside wall whereupon it is connected into the side of the collector in line with other exhaust mains.

To a 15-inch overhead main there were connected three 30-inch grinding wheels, and two 24-inch wheels. This main duct also goes through the wall and into the side of the collector.

Sand Blast Room

Next in line along the side of the 25-foot collector is an 18-inch main that exhausts from a sand blast room 8 feet wide by 20 feet long. Experience taught R. F. Stengel & Son that the most effective way to handle waste sand from such rooms is to offer low exhaust outlets. Hence, they provided an interior false wall of 16 gauge galvanized sheet steel that covers the side of the room except for an open slot along the bottom 18 inches in depth. This interior false wall is attached 6 inches away from the outer blast room wall with heavy angle irons.

This forms a hollow space between walls. Near the top and rear of the exterior wall an 18-inch opening was made for reception of an exhaust duct of this size by means of special pipe collar. This overhead duct carries through the wall in the same size and lines up with the other ducts that enter the side of the outdoor collector.

Inlets and Outlets

Still another battery of grinders nearby called for hooding and suitable sheet metal ducts for waste removal. There are in this group three 24-inch and two 30-inch wheels. The major dimension of the exhaust main here is 20 inches, but it diminishes to 16 inches just past the last machine on the line. Subsequently there will be added three more grinders to this main which then will terminate as a 12-inch pipe.

The four exhaust ducts already outlined comprise the lines going into the collector at present. All sheet metal is 18 gauge except that of the sandblast room line, which is 16 gauge. Branches are 20 gauge. Each duct has a cast iron blast gate. Each duct, further enters an individual section of the collector. In this design of collector the outlets are on the same side and near the upper edge.

But, instead of there being four collector outlets, to match the four intakes, there are two, each 30 inches in diameter. These join and the duct between the fan inlet and the nearer collector duct becomes 44 inches in diameter, which is the same as the fan inlet. The fan in this case occupies an end compartment of the collector casing. Its discharge is downblast and directly to atmosphere.

In mounting the collector the sheet metal contractor had to make and erect a platform, for the collector is 10 feet above ground level. This was made of 6 inch by 6 inch by ⅜-inch channel iron. The collector sits on top of the frame without special platform. Raising

(Continued on page 102)

Prosperity Predicted

at Michigan's 28th Annual Convention

THE 28th annual convention of the Michigan Sheet Metal & Roofing Contractors' Association, held at the Otsego Hotel, Jackson, on February 28 and March 1 and 2, was welcomed by Leo Conway, Acting Mayor, and a son of Charles Conway, a member of the association for many years. President George Lubahn responded.

Prosperity Predicted

Ben H. Price, executive secretary of the Greater Jackson Association, speaking on "Things Ain't What They Used to Be," called attention to some of the problems facing business today—unemployment, social security, old age pensions, crop control, taxes, disturbed labor relations, governmental regulation and control and diminishing exports. With ten and a half millions existing on direct relief or on the limited income from government sponsored work projects, there are no prospects for new roofs or air-conditioning systems among this group. The farmer's income has not increased to the point where he is a prospect for the products of our factories, and there is discord and strife in the ranks of labor. In our efforts to restore prosperity, he continued, we have gone to the ridiculous extreme of putting Government into competition with private business. Mr. Price said that his effort to compute the number of taxes in the price of a galvanized sheet used in roofing and metal work left him dizzy. Beginning with the man who mines the ore and following through the blast furnace, the rolling mill, the galvanizing plant and finally through the sheet metal shop to the completed job, the taxes added all along the line would mount well up to a hundred.

In spite, however, of all this uncertainty, confusion and bewilderment, Mr. Price believes light is beginning to appear on the horizon of a new day for business and a new prosperity for America. Government has abandoned its competition with the Utilities, Secretary Morgenthau announces a policy of borrowing to meet Government expense—no new taxes; Secretary Hopkins advocates modification of the Government control and regulation of business; the President calls upon labor to settle its differences; the Supreme Court recognizes the rights of private ownership of property and outlaws the invasion of those rights by force; the American Federation of Labor calls upon Government to abandon its policies of persecution of business, the removal of all barriers to business expansion and progress, relief from burdensome taxation; Congress displays a tendency to modify or abandon many of the experiments that brought about confusion and distrust and to get back to American fundamentals.

The speaker stated that many of the innovations that have been introduced into the American scene are here to stay. Many of them are desirable. If, through the sane application of them through an honest co-operation between Government and Business and Labor, business is permitted and encouraged to venture upon development and expansion—there is nothing to fear for the future. A tremendous consumer demand has been built up—new developments await exploitation, and once we get business really started we are certain of the greatest period of prosperity this country has ever known, and Mr. Price said he sincerely believed it is beginning to arrive.

N. J. Biddle, executive secretary of the Warm Air Heating and Air Conditioning Association of Detroit, explained the state license law which is being proposed for the regulation of heating, ventilating and air conditioning systems. The association decided it would be a good thing to have such a licensing act, and a committee will be appointed to go into details.

Organization

Jay Barton of the National Furnace Engineering Company, Detroit, talked on "The Necessity of Widespread Organization in the Warm Air Heating, Air Conditioning, Ventilation, and Roofing Field."

Mr. Barton believes that most dealer organizations fail for the lack of a definite program to follow, and after that for not having someone whose duty it is to see that the program is strictly followed out.

To give an idea of the market ahead, Mr. Barton called attention to the life of the average furnace as 15 years. The replacement market alone in 1929 was some 500,000 furnaces per year, but at no time since then have 250,000 furnaces been made in any one year for both replacement and new work.* The backlog of the replacement market is tremendous and new construction is starting to step out at a pace that Mr. Barton believes will surprise; he said that he wouldn't trade the possibilities of this field for any other industry that exists. Mr. Barton believes that the State Licensing law explained by Mr. Biddle will help immensely by causing work to be put in at minimum standards; that radio advertising by Illinois, Indiana, Wisconsin and Michigan groups could be successfully carried out in 1939; and that when the different associations are welded together, when all have licensing, real inspec-

*Mr. Barton's figures do not agree with those of the Department of Commerce. In 1937, according to the latter, 344,998 furnaces were produced, to which can be added enough more to reach a minimum of 400,000. In 1938, also, the total production would be in excess of 350,000.

tion, and installation standards set up, we can bring pressure to bear on the consumer to accept only installations that carry a certificate for customer satisfaction—this certificate to be issued only to contractors who will live up to standards as laid down by the combined associations.

These standards could also be made applicable to products handled. For instance, a cast furnace would call for a minimum weight for each size, and a steel furnace would have minimum gauges specified for body, head and radiator, and ratios of heating surface to grate areas set at a minimum.

Mr. Barton believes we can protect our industry by installing our equipment to standards that will keep the bulk of the warm air heating and air conditioning business where it belongs.

Mr. Barton suggested that a small committee be appointed to contact other mid-west states and local associations; that plans be laid for a committee from each interested association to meet in the near future to talk over common problems and the possibility of joining forces for the betterment of the industry; that, if sufficient interest is shown in a common program to inspire consumer confidence in the heating contractor, a general meeting be called for the purpose of determining ways and means of bringing to these members the warm air heating and air conditioning business they are entitled to.

Air Conditioning Future

J. H. Nymberg, Detroit branch manager of Gar Wood Industries, Inc., talked on the "Future of Air Conditioning," dwelling on winter air conditioning which has to do with filtering, circulating, warming, humidifying, and briefly blower cooling for summer.

Mr. Nymberg stated that forced warm air is meeting rapid acceptance among home owners. With the advent of automatic firing—oil, gas or coal stoker and the development of fractional horsepower motor and electrical controls—forced warm air has come into its rightful position. Advantages enumerated were:

1. Greater living space by elimination of radiators.
2. Better placement of furnishings and furniture. Windows more accessible.
3. Elimination of unsightly radiators with their dust and dirt.
4. Circulation of air, preventing stratification, etc.
5. Automatic regulation of temperature.
6. Proper humidity for health. Less temperature required for comfort.
7. Quick response to demands for heat. Adaptability for quick changes in weather.
8. Direct transfer heat for economical operation.

Mr. Nymberg stressed that there must be a good unit as a source for all these desirable conditions—gas, coal or oil-fired—but that the installation of the complete system is just as important, in many respects more important, for a good unit poorly installed means poor satisfaction to the owner. He warned that those who *sell* successfully must make *good* installations. Gar Wood, he said, has spent as much time in developing proper installations as in developing efficient units.

Salesmen of residence air conditioning, Mr. Nymberg said, have made the home owner too "thermometer conscious," and warned installers to leave themselves a little leeway on that temperature from room to room, because they might lose a good friend just for a couple of degrees. The system today must be automatic—turn itself on, turn itself off, and keep uniform temperature—for the same man who shovelled coal, carried ashes and had certain rooms which were drafty and cold, is now more exacting. The younger generation, of course, expect an improvement over what they saw yesterday.

With the automatic forced warm air unit has come a new conception of a basement. What was once a dark, dingy place given up to coal bin, furnace and ashes, with possibly some cobwebs, dirt and other miscellaneous materials, has now been transformed, in many instances, into the most livable and attractive part of the house, with recreation (sometimes called whoopee) rooms, with bars, game rooms, etc. With no coal to shovel, no ashes to carry, and automatic regulation of the heating system, people have time to go to the basement for amusement and recreation. He urged dealers to bear this in mind as part of the modern heating system they have to sell and what the buyer expects to receive for his money.

A Buyer's Market

Many companies, he said, build equipment to furnish what suits the customers' needs. Home owners have become conscious of automatic heating and air conditioning. It is the dealer's job to present it properly and install it correctly. He called attention to the fact that this is a buyer's market, that owners must be sold, and sold the particular merits of the particular equipment handled by the dealer, for customers don't just order an automatic heating plant and take anything offered. They want to be sold, and told, and told in detail. Therefore, those who engage in this modern air conditioning program must be equipped to sell, to search out prospects, tell them the merits of air conditioning for their home in general and the merits of what the dealer has to offer in particular.

As to the future of air conditioning, Mr. Nymberg asked dealers to look about and see the strides it has made in all its phases. Communities known in times past as "hot water towns" or "steam towns" are swinging rapidly over to "home air conditioning towns." Air conditioning is a phrase on everyone's tongue.

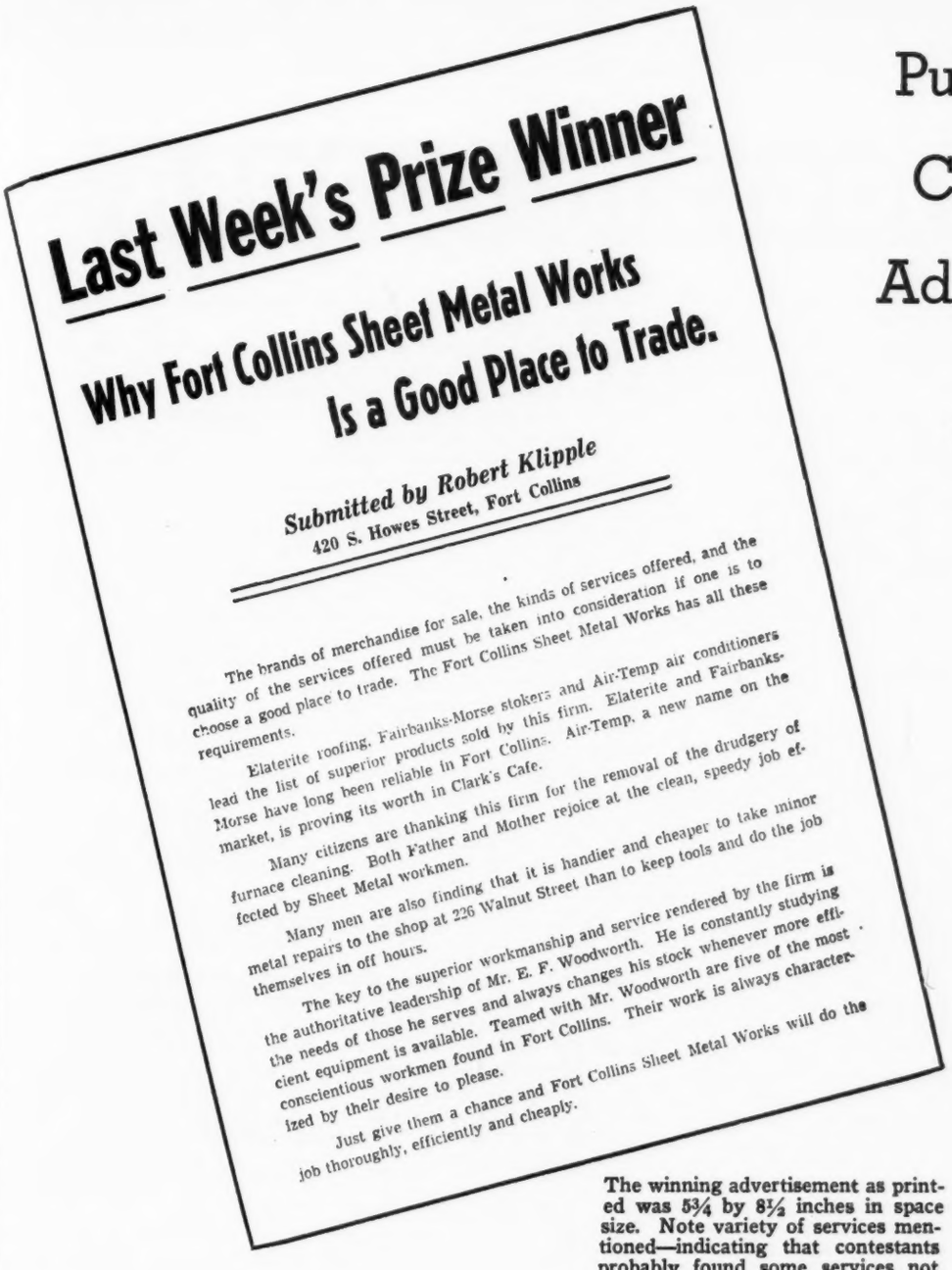
FHA Loans

Never has there been a period in this country in which it has been as easy to acquire a new home. Through the FHA, whereby the government guarantees the mortgage and spreads it out in equal monthly payments covering taxes, insurance and principal, it has been made possible for thousands and thousands of people in moderate circumstances to buy a new home. Nineteen hundred and thirty-eight, he said, was the best year of residential building since 1930. Outstanding experts who study trends and compile statistics look for 1939 to show an increase over 1938, as much as 40 per cent. Dodge estimates that dwellings in 1939 will be built to accommodate 240,000 to 250,000 families. Other authorities estimate 500,000 dwelling units for 1939. It has been estimated that the country is behind about seven million homes, and it has been estimated the yearly number of homes must approach

(*Continued from page* 58)

Public Wrote Contractor's Advertisement

By H. R. Simpson



Last Week's Prize Winner

Why Fort Collins Sheet Metal Works Is a Good Place to Trade.

Submitted by Robert Klipple
420 S. Howes Street, Fort Collins

The brands of merchandise for sale, the kinds of services offered, and the quality of the services offered must be taken into consideration if one is to choose a good place to trade. The Fort Collins Sheet Metal Works has all these requirements.

Elaterite roofing, Fairbanks-Morse stokers and Air-Temp air conditioners lead the list of superior products sold by this firm. Elaterite and Fairbanks-Morse have long been reliable in Fort Collins. Air-Temp, a new name on the market, is proving its worth in Clark's Cafe.

Many citizens are thanking this firm for the removal of the drudgery of furnace cleaning. Both Father and Mother rejoice at the clean, speedy job effected by Sheet Metal workmen.

Many men are also finding that it is handier and cheaper to take minor metal repairs to the shop at 226 Walnut Street than to keep tools and do the job themselves in off hours.

The key to the superior workmanship and service rendered by the firm is the authoritative leadership of Mr. E. F. Woodworth. He is constantly studying the needs of those he serves and always changes his stock whenever more efficient equipment is available. Teamed with Mr. Woodworth are five of the most conscientious workmen found in Fort Collins. Their work is always characterized by their desire to please.

Just give them a chance and Fort Collins Sheet Metal Works will do the job thoroughly, efficiently and cheaply.

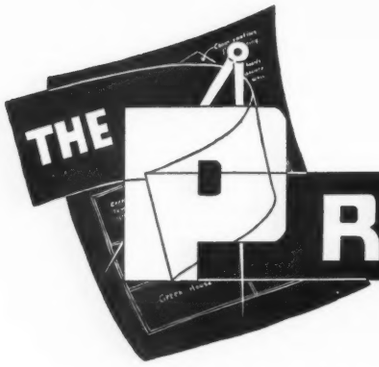
The winning advertisement as printed was 5¾ by 8½ inches in space size. Note variety of services mentioned—indicating that contestants probably found some services not previously considered.

IF consumers should write advertisements on your sheet metal business, what would they say?

Ft. Collins (Colorado) Sheet Metal Works got the answer to that question with an ad-writing contest. The stunt was carried out in cooperation with 14 other, non-competitive, Ft. Collins merchants as feature of a weekly advertising spread. The merchants took their turn at a $5.00 cash ad-writing prize.

The week of the Ft. Collins Sheet Metal Works contest, there was a complete description of the business, featuring its head, E. F. Woodworth. The following week, the name of the prize winner was announced, with his copy, in space three columns by 10 inches. The subject was, "Why Ft. Collins Sheet Metal Works Is a Good Place to Trade." The reproduced ad shows what Robert Klipple, local man,, wrote.

The contest was open to Ft. Collins district people only. The advertising copy submitted was limited by the rules to 350 words. The promotion ran for 15 weeks. Regular copy of the Ft. Collins Sheet Metal Works, in space two columns by three inches, featured stokers, air conditioning equipment, other lines.



Your comment or experience is invited.

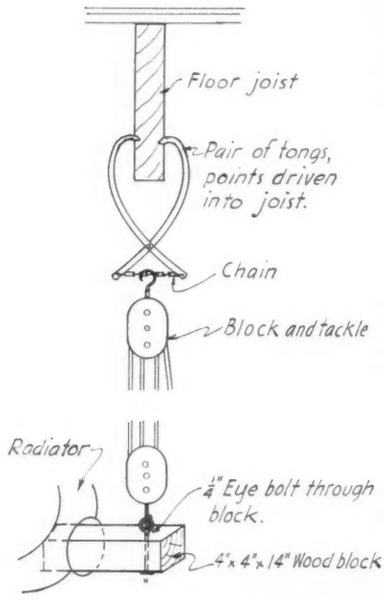
PROBLEM CORNER

Radiator Hoist

American Artisan:

In the November 1938 issue, C. W. S., West Virginia, asked if any reader had developed a hoist to be used to raise radiator or combustion sections in basements where headroom prevented any form of derrick.

For the past three years, we have been using a device that enables us to reset furnaces more easily. This device consists of a pair of tongs, with sharp points, and these tongs



are driven into the joists with a hammer. The opposite ends of the tongs are joined by a chain, from which we suspend our blocks and tackle.

The sketch enclosed shows the general construction, also our method of attaching block and tackle to the radiator. To date we have not lifted any combustion section. During a reset we lift the radiator from the combustion chamber, remove the combustion chamber, then remove the radiator by lowering it to the floor.

We obtained these tongs from our local farm implement store.

W. S. SCHOCK, Manager,
Ideal Furnace Sales Co., Saginaw, Mich.

◆

Rating Large Furnaces

American Artisan:

I notice the inquiry from F. T. D., British Columbia, in your problem corner and the reply from Mr. S. Konzo, University of Illinois.

His reply is very complete based on grate area and bonnet efficiency, but bonnet efficiency can not be determined except by test, as he points out. Therefore, there must be a more practical way of rating these big furnaces.

The manufacturers of big furnaces have all apparently agreed—without agreeing at all—that the easy way of rating these furnaces is the number of Btu per square foot of heating surface.

The Guide gives the maximum rating consistent with good practice at 3,500 Btu per sq. ft. Quite a common rating on the part of manufacturers, for a general purpose rating, is around 3,000 Btu per sq. ft., which is a conservative rating for continuously heated buildings.

In intermittently heated buildings additional capacity must be allowed; that is, the rating must be lowered for a given furnace to take care of the heating up load of a given building, and the 3,500 Btu per sq. ft. rating as given in the Guide is supposed to be the maximum for good practice when crowding the furnace for heating up a cold building.

In the letter of inquiry it was specified 700 sq. ft. of heating surface, and that at the rate of 3,500 Btu per sq. ft., would give the maximum rating of 2,450,000 Btu; and at 3,000 Btu per sq. ft. of heating surface, 2,100,000 Btu.

For the intermittently heated building, our practice would put a rating of 2,350 Btu per sq. ft. on such a furnace when used in approximately this climate, which would reduce the rating on that furnace to 1,645,000 available for heating up the building at the same time it was carrying the heating up load of the material.

E. K. CAMPBELL,
E. K. Campbell Heating Company,
Kansas City, Mo.

◆

Skylight Glass

American Artisan:

We should like to know what type of glass is most satisfactory for use in skylights. We notice that manufacturers list ribbed wire glass and we have been using this type of glass, but our local glass house always tries to sell us what they call hammered or luminex wire glass. This seems to be a clear glass with light waves on the surface and one side is further marked with very fine waves. This glass does not seem to have the ability to disperse light as well as ribbed glass.

H. A. B., Kansas.

—

Reply by The Editors

We have telephoned three skylight manufacturers in Chicago and the general consensus of opinion of the three is that hammered glass may provide just a little better light dispersion than ribbed glass, but if you will use the standard form of seven ribs to the inch, you should get excellent light dispersion at the standard measuring distance of 23 feet from the glass.

All three of these manufacturers use both ribbed and hammered glass, according to specifications, but all three recommend that you study the inside conditions carefully and if there is considerable moisture in the air, such as would prevail in a laundry or dry-cleaning plant, then you will have a great deal of condensation on the inside of the glass in the skylight and the ribbed glass will carry this condensation to the gutter at the bottom of the glass more efficiently than the hammered glass. Droplets of water tend to form at the peak of the hammer marks and fall down, which does not occur in the ribbed glass. This can be prevented when hammered glass is used by pitching the glass steeper than the 5" rise to the foot, which is standard construction.

We would say that after you have solved the problem of condensation, you can take your choice as to type of glass without any fear of trouble.

Chimney Liners

American Artisan:

I operate in a territory having many old houses; a substantial number of which are being purchased by wealthy people. Many of these houses have chimneys with one flue with several fire places opening into each flue. On several installations using oil burners it has been necessary to run an 8-inch galvanized iron flue down through the chimney in order to give the burner a direct opening to the outdoors. This practice provides better draft and keeps fire place soot out of the burner smoke pipe. The trouble is the galvanized iron does not last very long and I would like to know about any special material having longer life.

R. K. S., Connecticut.

Reply by
The Editors.

The experience of the gas company with gas heating and oil burner companies with oil heating in the Chicago area has resulted in the use of two materials for flue lining.

The first material is a vitreous enamel pipe with the enamel surface both inside and outside. You probably can get the source of supply from your nearest large gas company. If not, we attach proofsheets of an article on this subject and a list of enamelers.

The second and much preferred material is 26-gauge, 18-8 stainless steel. Be sure the gauge is at least 26. Of even more importance is the fact that the sections as you put them together must be fastened with either stainless steel sheet metal screws or stainless bolts and nuts. Do not use an ordinary sheet metal screw as it will not stand up under the temperatures and gases of combustion.

These sheet metal screws will cost you approximately 3c apiece, and the stainless steel bolts and nuts (⅛ x ½ in.) will cost approximately 6c.

In the Chicago area 18-8 liners have been in use now up to five years without showing any deterioration.

See, also, article "Chimney Liners," page 44, Dec., 1938, issue.

◆

Capacity of Oval Containers

American Artisan:

Will you please advise if any manufacturer has ever published a chart which gives capacities of oval shaped tanks in terms of gallons?

A. P., California.

Reply by
The Editors

So far as we can find there are no published tables giving volume of oval containers.

You can figure your volume from the following information:

The volume of an oval container is found by multiplying 3.1416 × ½ the short diameter × ½ the long diameter × the height of the container in feet or inches, according to whether your diameters were feet or inches.

For example, if you have an oval container 8 feet in diameter on the long axis and 4 feet in diameter on the short axis and 10 feet high, the volume will be

3.1416 × 4 × 2 × 10 = 251.328 cu, ft. × 7.48 = 1879.93 gal.

One gallon is .134 cu. ft. or 1 cu ft. equals 7.48 gallons. After you have obtained the cubic feet volume, you can obtain the gallons capacity by multiplying the cubic feet by 7.48 gallons.

◆

Asbestos Pipe Covering

American Artisan:

In our local group we have been debating whether asbestos paper wrapped on bright tin pipe affords any insulation, or whether the paper acts just the opposite. Can you tell us the actual test results?

C. G., Utah.

Reply by
The Editors

The University of Illinois says in Bulletin No. 117:

"4. Significant Conclusions.—The results of the tests have been given some publicity heretofore, but not in the complete form presented in this bulletin. The following significant results as applied to warm-air furnace heating are deserving of special emphasis:

(1) The use of thin sheets of asbestos paper on bright tin heat pipes results in a waste of heat. The use should be abandoned.

(2) Uncovered bright tin pipes are more efficient carriers of heated air than asbestos-paper-covered bright tin pipes. See item (4).

(3) This fact is true regardless of the degree of brightness of the tin surface.

(4) No small number of applications of asbestos paper will suffice as an insulator. Several thicknesses are necessary to make a covering equal in this respect to the bare tin.

(5) The accumulation of dust and dirt on the pipes does not greatly alter the amount of the loss.

(6) The heat loss from warm-air furnace pipes covered with one layer of asbestos paper is a serious item in the cost of heating, amounting to more than 5 per cent of the coal consumption, depending upon the number and sizes of the pipes used.

(7) The fact that pipes are partly protected from convection currents of air by joists and studding does not greatly affect the loss.

(8) Unless the insulation excels the uncovered bright tin in heat insulation properties it should not be used.

(9) Such materials are available and the tests have shown their merits."

◆

Smoking Furnace

American Artisan:

I have a customer with an 18-inch cast iron furnace, horseshoe type radiator, that I can not stop from smoking. I have had this job torn down three times now, inspecting castings carefully for cracks, warpage and blisters, but same checks O.K. The third time I reset the furnace, I caulked all cement joints with asbestos rope, also cleanout collar on front of radiator and also the smokepipe connection off of rear of radiator, as I have eliminated some complaints on other jobs by doing this.

This job takes about 1½ hrs. from time of starting fire until smoke shows up in the rooms. It does not smoke continuously. There are only two warm air runs off of this furnace—one 10-inch and one 12-inch and one cold air of sufficient size. The chimney is an 8x8-inch flue, lined, and appears to have sufficient draft. There never appears to be any smoke in basement.

Several of my heating associates locally here claim that a downdraft in the chimney is causing the trouble, but my contention is that if we're getting a down draft, the smoke would have to show up in the basement, by puffing through feed door, or front cleanout collar of radiator and then seeping through some cracks in the floors. The smoke comes through the registers. At times it will come through one register, and again it comes through the other.

The cement joints on this furnace are very shallow.

Hoping you or the readers can give me some information on this matter, I am

C. W. S., W. Va.

Reply by
The Editors

In the last several years we have answered a number of very tricky smoke problems, but we do not remember any one which seemed quite so impossible as the one you mention in your letter. Frankly, we are at a loss to offer you any concrete suggestions.

It has been our experience, however, that some of these very troublesome smoke problems have been solved by patient investigation because these smoking conditions do not always occur under the same weather conditions or method of firing or operating cycles of the heating plant.

We will publish your problem in the Artisan and see if any readers have encountered the same difficulty.

[Editor's Note: If any reader has a suggestion for this reader we will be glad to publish suggestions which seem applicable]

Overhead Does NOT Always Follow Sales Volume Down and Up

By Benjamin F. John

IN any discussion of costs and methods there is necessarily a good deal of explanation needed to show each correct step and the proof. The reader who is interested and desirous of improving his own methods separates the parts of the discussion that appeals to him and reads it over and over and analyzes it to fit his own needs and criticises them. This happened after the Association members' statements were completed for 1932 when, in the statements, the lowest volume since 1924 was reached, and because the lower figures of all costs could be easily seen and checked.

Before discussing the individual statements of 1932, it might be well to show the total statements of approximately 20 shops, ranging in volume (in 1928) from $5,000 to $86,000 a year. (See Table A)

the decrease in volume of business done when a single shop's six years was compared, but rather because one cost (overhead expense) did not decrease in proportion nor was it because the smaller volume shops lost their profits as their volume decreased, anymore than the larger volume shops. The number of shops that made a profit and the number that had a loss each year is shown in the following table.

Year	Profit	Loss
1928	19	1 (lost $0.32)
1929	14	8
1930	11	9
1931	8	12
1932	6	14
*1933	11	5

*4 shops not reporting.

TABLE B

MATERIAL—As charged at cost on bills	$64,831.21	
MATERIAL—Cost (Ledger) as above	64,704.89	
Profit, first cost	$ 126.32	$ 126.32
LABOR—As charged at cost on bills	$61,312.12	
LABOR—Cost (Ledger) as above	61,124.55	
Profit, first cost		$ 187.57
PROFIT—As added or asked on bills (net) and estimates awarded		37,099.62
PROFIT—As added or asked on bills (net) and estimates awarded		37,102.62
Total Profit before deduction		$37,416.51
TOTAL PROFIT—As asked		$37,416.51
THE LOSS—Overhead Expense (as Ledger)	$102,107.79	
Overhead, added to Bills	61,124.55	
Loss on Overhead		40,908.24
Loss		$3,491.73

This six year statement for 20 shops was used in the 1932-33 study and in the continued search in 1935 and since was selected as representing a cross section of all the jobbing shops and all classes of work including widely separated districts within a radius of 30 miles.

In a study of this statement for six years, it is interesting to note the variance in "decrease of costs" each succeeding year. This was NOT entirely because of

Another study and search was made in 1935 of 19 shops included in the foregoing six year statement. Through an error one shop was left out. These 19 shops did a volume in 1932 of $224,053.61

COSTS FROM BALANCED BOOKS

For Material	$ 64,704.89	
For Labor	61,124.55	
For Expense (Overhead)	102,107.79	
		$227,937.23
Net Loss of 19 shops		$ 3,883.62

TABLE A

Year	Material	Labor	Overhead	Profit	Loss	Total Sales
1928	$161,792.41	$133,010.16	$122,657.46	$ 50,672.09	$ .32	$ 468,131.80
1929	152,521.27	144,458.80	152,009.48	49,683.83	4,770.73	493,902.65
1930	112,648.28	104,753.76	143,204.78	10,920.09	9,212.22	362,314.69
1931	91,963.76	84,571.24	132,232.28	5,478.39	15,014.17	299,231.50
1932	73,264.08	66,114.12	113,350.01	5,276.55	10,343.58	247,661.18
1933	106,968.25	67,774.79	96,406.62	20,397.03	3,994.16	287,552.53
Totals	$699,158.05	$600,682.87	$759,860.63	$142,427.98	$ 43,335.18	$2,158,794.35

In these shops 6 made a profit and 13 had a loss. The left out shop had a loss.

The amount of the overhead cost recovered on the bills and the profit or loss on first cost and the profit added or asked on all bills is shown in Table B.

Those shops within the group studied which did keep balanced books and decreased their "profit asked" by not charging *all* their overhead to the bills, had various excuses why all overhead could not be included. The most prevalent excuse was that in the growth of their business certain items of expense had grown on the business that in fairness could not be stopped. One of these was the amount paid to those who could not be regularly employed on productive work during dull periods, but were still carried on the payroll as unproductive labor or expense. Some contractors justified this as their contribution to steady employment the year 'round. However, the total of the Overhead *not charged* must be deducted from the profit if any.

The following table shows the totals from 151 statements for approximately 18 shops for eight years from 1928 to and including 1935, as selected to represent a cross section of the jobbing trade, doing an annual business of from $5,000 to $90,000 per shop.

151 Statements—Total business		$2,714,871.93
COSTS (From Balanced Books)—		
For Material	$879,498.43	
For Labor	754,621.99	
For Expense (Overhead)	946,452.24	
		2,580,572.66
Net Profit (5%)		$ 134,299.27

The first net cost profit on the Material and Labor was about $11,000, but we will omit the material and labor for the present and set up the first cost profit on "costs." The Overhead cost and Overhead charged is as follows:

Cost of Overhead	$946,452.24*
Overhead charged on bills	754,621.99†
LOSS ON OVERHEAD	$191,830.25
Profit asked on bills	326,129.52
8 years—NET PROFIT AS ABOVE	$134,299.27

The Profit percentage asked was 16.6 per cent
The NET Profit percentage was 5.0 per cent

Approximate loss on Overhead, 11.6 per cent

*Spent for expense.

†Recovered.

A comparison of these 8 years with statements of previous like periods led to the assumption that these periods represented a fair full cycle in the life of a jobbing shop including the poor, medium and good years. Assuming, as we seem to have indicated in the several searches and comparisons, the question is: "Should business be based on an 8-year cycle? Perhaps such a basis would tend to make the poor years better and the medium good, and the good years would have to be depended upon to make the whole general average better..

[Part 3 will follow]

Capacities at Combustion Rates Above 7½ Lbs.

By L. W. Millis, Security Stove & Mfg. Co., Kansas City, Mo.

REFERRING to the article, by G. A. Voorhees (page 66 of your October, 1938, issue) which gives an especially valuable method of calculating the increased warm air pipe area if more, and still more, coal be burned than the standard 7.5 lbs. of 12,790 Btu per hour. It is a graphic illustration of what we might expect to pipe off of a furnace when the overload ranges from 5 to 20%. It is especially valuable when used to show a buyer what he tried to make his old, inadequate furnace do.

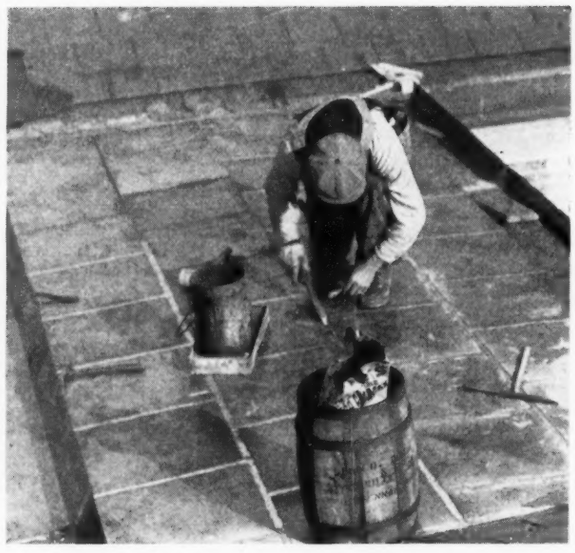
I submit herewith a table showing the Btu input, the Btu delivered at register (55% at canopy and 25% standard basement loss) and the square inches of warm air pipe area; also the calculated efficiency up to 7½ lbs. per square foot per hour and the estimated efficiency when fired above that rate. These figures are the ones that would apply to the 20 inch furnace used in Fig. 2 in Mr. Voorhees article.

These figures indicate that an increase of 20% in pipe area above the standard may be obtained with a drop in efficiency of only about 4%. However, many experienced furnace men would hesitate about telling a buyer what an overload of even one pound per square foot of grate would do to his heating plant. Coal having a Btu of 12,790 Btu per pound would probably have about 12% ash. The 20 inch furnace would probably have a grate area of 1.402 square feet. At an 8½ lb. rate per square foot there would be burned approximately 13 lbs. of coal containing over 1½ lbs. of ashes. In an eight hour period there would be about 12 lbs. of ashes. Furthermore, when so high a rate is maintained the temperature in the fire pot is so high that the ashes are heated to their fusing point resulting in clinkers, and plenty of them.

A high firing rate cannot be maintained during the entire heating day and the apparent increased warm air pipe area becomes a disappointment. Besides clinkers there are other disadvantages such as "rotten" grates, warped pots, hot basements, and "cold 70" or more likely "cold 60." Such a furnace becomes a good argument for "Hot water heat" and is also a black eye for the manufacturer of what was intended to be a perfect furnace. If Mr. Voorhees' table is used to show the iniquities of an over-sold furnace, it will prove of great value to the industry.

THIS TABLE IS CALCULATED ON THE ASSUMPTIONS IN MR. VOORHEES TABLE NO. 2

Lbs. per Sq. Ft.	Input B T U	Reg. Del. B T U	Sq. In. Pipe Area	% Efficiency At Register
5	89,660	37,200	273	42
5½	98,626	40,700	299	41
6	107,592	44,400	326	41
6½	116,558	48,100	354	41
7	125,524	51,800	381	41
7½	134,490	55,500	408	41
8	143,456	58,000	426	40
8½	152,422	60,400	444	39
9	161,388	62,600	460	38-39
9½	170,354	64,700	475	38
10	179,320	66,600	490	37



Soldering Flat Seam Metal Roofs

By James McCawley
Secretary, United Roofing Contractors Assn.

THE successful application of a soldered flat seam roof depends upon properly blended solder, the right type of flux, soldering irons or coppers of the right weight heated to the correct temperature and metal properly tinned, all in the hands of a mechanic who knows his business. Such mechanics many declare are born and cannot be taught. How much truth there is in this assertion is debatable, but there is no doubt that some workmen pick up the art of soldering within a few months while others spend years without mastering it.

The truth is that soldering is a matter of combining skill and judgment, and those capable of exercising the required judgment are sometimes difficult to find. The soldering of flat seamed roofing should not be entrusted to the tyro, as poorly sweated joints may be mistaken for a completed job, until the first storm rips the seams apart.

Methods of Tinning

Sheets to be soldered must be tinned. This consists of applying a thin film of solder to the parts of the sheet to be folded and secured. The film must be applied to both sides of the sheet. If applied to one side only, a partly soldered joint will result. Tinning cannot be performed on metals which are dirty and greasy or oily. Oil is almost always present on galvanized steel or terne plate roofing. These sheets are dipped in a bath of palm oil after the soft coating is applied.

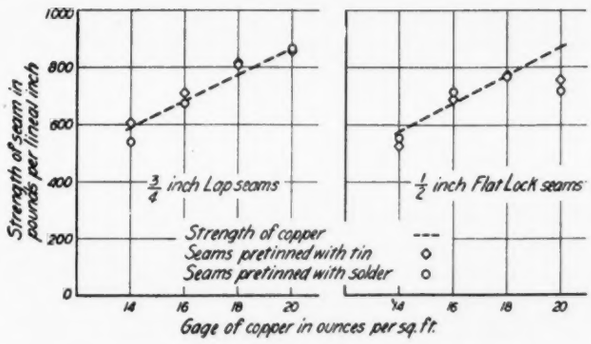
Parts to be tinned must be cleaned. This cleaning may be done by painting the portions to be tinned with raw muriatic acid. Care must be exercised to see that the raw acid does not adhere to any portion of the metal outside of the unsoldered zone.

For small sheets the most convenient and best method of tinning sheets is to dip them in a bath of melted tin, the liquid metal being just deep enough to tin the correct width. In this way the sheared end of the sheet is tinned also. If possible pre-tinned sheets should be secured from the mill. The tinning of course can be done by the rather laborious method of applying it by the use of the soldering copper.

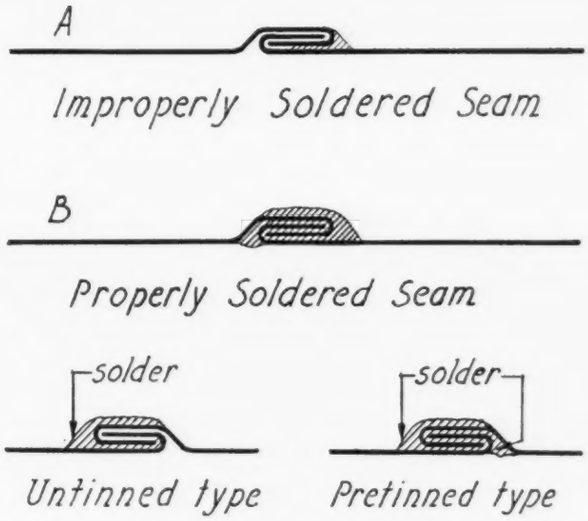
Purpose of Tinning

To do any kind of soldering work the soldering copper must also be tinned. Much of the time wasted by inexperienced tin-smiths is spent attempting to apply solder to a dirty surface using a dirty soldering copper. In tinning the copper, the iron is heated to a temperature at which it will melt solder readily. Then all four sides of the copper are filed until they appear bright and clean. Sometimes when it is desired to ensure that solder will stick to one side of the iron only it is the practice to file one side only and leave the remaining sides dirty.

When this has been done, heat the iron again to the same temperature and rub the point in a lump of salammoniac. Using powdered resin as a flux, melt a small quantity of solder in any convenient receptacle, and while the iron is still hot rub each face of the point of the soldering copper in it. The soldering copper is now ready for soldering—provided that it is the proper weight.



Above—Comparison of results of pre-tinning with tin and with "50-50" (half lead, half tin) solder. Each point is an average of 8 specimens. Right—Properly and improperly soldered seams, showing results when seam is not "sweated." Charts from "Sheet Copper", Copper & Brass Research Assn.



Light irons have their uses, but they are valueless on metal roofs. The most convenient tool weighs ten pounds. At this weight it is easy and not too heavy to handle and at the same time it is large enough to retain the heat. Two soldering coppers should be used, one employed in soldering operations while the other is being heated over the flame of a blow torch or charcoal fire. There are electrically heated irons on the market, but skilled metal workers seem to fight shy of them.

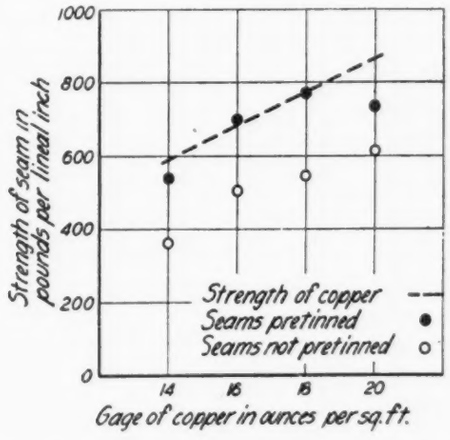
Flux Applications

To properly solder seams the seams must be painted with a flux. Solder will not adhere properly to an oxidized surface. The name flux is given to a number of materials which remove and prevent the formation of oxide. The two most popular fluxes are zinc chloride and resin, to which can be added raw muriatic acid—a flux which should be sparingly and carefully used.

Zinc chloride is merely raw muriatic acid changed from its raw state by a process called "killing." The raw acid is poured into a suitable container, often an old fruit can, and diluted to half strength. Into the liquid are thrown small pieces of zinc. Immediately the acid turns into a furiously boiling liquid. More zinc is added until the boiling ceases and the surface of the liquid once more becomes smooth. At this stage the muriatic acid is in a killed condition and has changed to zinc chloride.

The seam is then painted with the flux, a small brush being used to coat the seam. Only the cheapest of brushes should be used as the brush will be in no condition to be used again.

Zinc chloride is a suitable flux for soldering iron, zinc, monel and copper. However, it should be used carefully in the case of copper to avoid injury to the metal. The proper flux for lead is tallow. The soft galvanized coating on "tin" roofings is liable to be eaten away by an acid flux, and the use of resin is recommended. To guard against possible injury to the metal, a resin flux is preferred to zinc chloride in soldering copper. Resin requires more labor, but is a highly satisfactory flux producing as strong a soldered joint as zinc chloride. It is somewhat difficult to use on windy days and on steep inclines owing to the powder sliding or blowing away, but even under such conditions it can be burned on to the metal.



Above—Effect of pre-tinning on strength of one-half inch flat-locked seams. (From "Sheet Copper," Copper & Brass Research Assn.) Left—Mechanic soldering in vertical divider for an expansion joint in a box gutter.

And now we come to solder. No first class job of soldering can be done if poor solder is used. Cheap solder more often than not is manufactured of scrap metals salvaged from plumbers and tinsmiths' shops, full of impurities and containing lead and tin in the wrong proportions. All the labor that has gone into tinning the metal, tinning the soldering iron and using the flux is all wasted if impure solder is used. Cheap solder in the end is likely to become expensive material, expensive because more solder is required to fasten the seam and more labor expended in attempting to "sweat" the seam with a solder that refuses to flow freely and will not stick to the tinned soldering iron or to the seams.

Good solder is manufactured from equal quantities of virgin tin and lead, generally described as "half and half" solder, because of the 50 per cent proportion of the two metals. All that is required to fasten seams securely is a thin film of solder "sweated" into the seam. Because of this feature the seams should be malleted flat without distorting the metal. There should be no necessity for wasting solder in the filling of wide open seams.

"Sweating"

"Sweating" is the name given to the capillary action which causes solder to flow into a single locked seam continuing up and around until it has completely enclosed the edges of both sheets. Such a seam is stronger at the soldered area than at any other portion of the metal. Too many workmen are content with floating the solder along the edge of the seam. This type of soldering is easily fractured.

The first step in soldering is to "tack" the seam here and there with a small piece of solder, then beginning at one end of the seam rest the soldering iron on top of the seam moving it slowly along the length of the seam. Running the iron along the edge only tacks the edge, but running the iron along the top of the seam produces an action which sucks the liquid solder inside the folds of the two sheets. This sweating action only works, it should be noted, when the seam itself is heated to a temperature similar to the melted solder.

Many are under the erroneous impression that the soldering iron is heated to melt the solder. This is only one of the functions. The other function is to heat the seams or joints to be soldered. The irons must not be too hot, just hot enough to melt the solder and heat the seam. Care must be taken with soft metals such as lead and zinc that the soldering irons do not weaken or melt the metal sheets. Never heat the soldering iron until it is red hot. As a final admonition, never pile up heavy bands of solder on top of a seam. The excess solder will not make a good soldering job stronger, and a badly sweated seam will remain weak.

Immediately on completing soldering of the entire roof, it is essential that the surface be cleaned to free it from excess resin or any acid flux which might damage or stain the sheets. To neutralize any acid the roof should be washed with a solution of soap and 5 to 10 per cent of washing soda.

Michigan Convention

(*Continued from page* 50)

700,000 to complete the home requirements program. Every one of these new homes will have a heating plant and an increasing number will have automatic heating and air conditioning plants.

Mr. Nymberg also called attention to the replacement field, wherein present heating plants are removed and new automatic heating plants installed—a source of very profitable business with many dealers is the removal of the old warm air furnace and the installation of the modern automatically fired, forced warm air unit, with necessary changes in the duct system to adapt it to forced air.

Mr. Nymberg believes that "The Future of Air Conditioning" is well assured.

Goodyear Plant

The meeting was closed on Wednesday afternoon in time to allow the guests to go through the Goodyear Tire & Rubber Company plant. A buffet dinner was served through the courtesy of the Jackson Association, following which entertainment was provided by members of the Southern Michigan Prison.

At the executive session on Thursday morning, Lansing, Michigan, was voted the 1940 convention city.

The association voted to sponsor the proposed license law. They also approved the setting up of a heating, air conditioning division in the association.

1939 Officers

President—Peter Vander Waals, Lansing
Vice-President—Glenn Rynbrand, Kalamazoo.
Treasurer—Peter O. Wierenga, Grand Rapids
Secretary—F. E. Ederle, Grand Rapids

Directors

W. W. Busch, Detroit	George Lubahn, Jackson
James Hage, Flint	John Erhardt, Grand Rapids
Guy Van Doren, Jackson	Benjamin Graf, Ann Arbor
Adam Schepper, Bay City	John Sherk, Detroit

Through-Wall Flashing

Paul G. Davis of the Cheney Company, speaking on "Through Wall Flashing," called attention to the advent of present day construction consisting of all masonry and fire-proof work of the modernistic type of building as well as the monolithic concrete construction which has eliminated enormously the use of metal cornice work, gutters, downspouts, valleys, and other types of valuable sheet metal work. However, he reminded contractors, there is involved in this new type of work enormous amounts of sheet metal work that can be just as valuable and just as profitable as the old-time construction. It only awaits the proper promotional efforts.

The speaker compared, for example, a brick building with a flat roof section and parapet walls, a building 100 feet square or having a 400 foot perimeter. In the past the amount of exterior sheet metal or flashing would total less than 175 square feet which includes

(*Continued on page* 106)

VOTE

VOT

RESIDENTIAL AIR CONDITIONING SECTION

BEGINNING in this issue and continuing through the summer, we plan to devote a large portion of this section to problems of cooling.

As a foundation, Professor Konzo will write a series of articles in which cooling calculations, effect of structural changes, cooling by water, cooling with compressors, controls of cooling systems, proper location of registers and other problems will be discussed.

Supplementing will be another survey of attic ventilation or night air cooling in several cities; typical cooling installations dealing with interesting problems; and a considerable quantity of short material for day-to-day application.

We said last season, and we again repeat, it is our hope this cooling material will be of practical value. Your suggestions for articles will, therefore, be appreciated.

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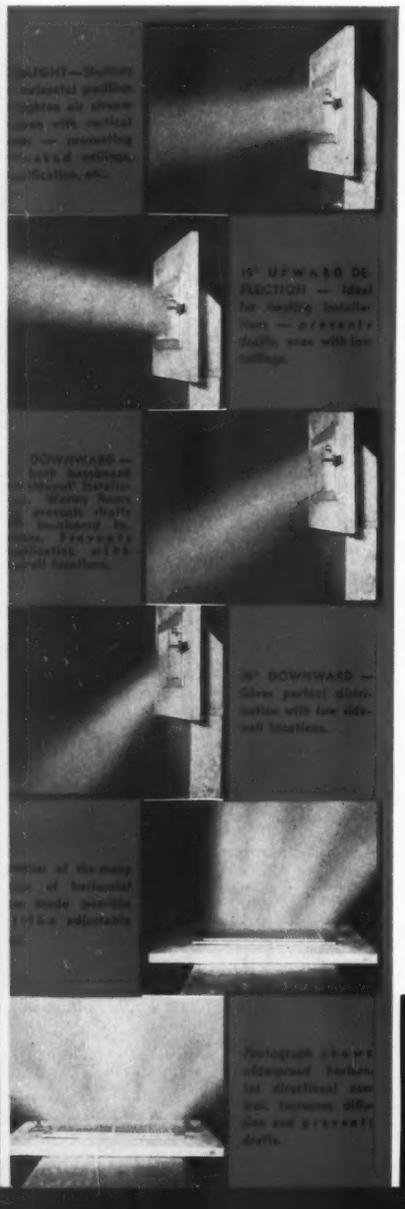

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REGISTERS . . . GRILLES . . . DAMPER CONTROL SETS . . . ACCESSORIES

Forced Air Heating Facts From the Research Residence

Calculation of the Summer Cooling Load

By S. Konzo
Special Research Assistant Professor
Engineering Experiment Station
University of Illinois

THE first step in the determination of the size of cooling equipment and appurtenances necessary for a room, an office, a shop, or a residence is the determination of the hourly cooling load. The method of calculating the cooling load has not, as yet, been completely standardized; in fact, a great many different methods of calculating the cooling load have been proposed and are in use. In addition, the capabilities of different types of cooling systems differ to such an extent that individual variations in the method of calculating the cooling load are necessary for different types of units. For instance, the selection of a dehumidifying type of unit requires some modification of the method that would prove applicable in the selection of a mechanical condensing unit. In this article only general features of design will be discussed.

Very close cooperation must exist between the installer or designer of the system and the engineer who represents the manufacturer of the cooling equipment to be installed. For large installations the latter party will probably bear the sole responsibility of making the determinations of the cooling load and the size of the cooling unit. This does not preclude the necessity on the part of the installer of acquainting himself with the fundamental steps in the process, particularly since in small plants he will bear most of the responsibility of making the system work in a satisfactory manner.

Nature of the Cooling Load

Of what does the cooling load consist? If the atmosphere within the given structure is to be maintained at a given temperature and relative humidity, any source which tends to raise either the temperature or the humidity may be considered as a factor to be considered in the cooling load. Heat and moisture must be removed as fast as they enter the structure. Otherwise the atmospheric conditions will become steadily worse from the standpoint of human comfort. For convenience in calculation, the heat quantities which comprise the cooling load (see Fig. 2) may be itemized as follows:

"Item (1) Heat Transmission through walls not exposed to sun.

Item (2) Heat Transmission through walls exposed to sun.

Item (3) Heat Transmission through windows and doors not exposed to sun.

Item (4) Heat Transmission through windows exposed to sun.

Item (5) Heat Transmission through ceilings.

Item (6) Heat Transmission through floors.

Item (7) Heat brought in by filtration or ventilation air.

Item (8) Heat given off by occupants.

Item (9) Heat given off by electric motors.

Item (10) Heat given off by electric lights.

Item (11) Heat given off by appliances.

Before presenting a detailed discussion of the method of calculating the cooling load, a brief summary of indoor design temperatures and outdoor design temperatures will be given.

Indoor Design Temperatures and Humidity

The "Comfort Chart" established in the Pittsburgh Laboratories of the American Society of Heating and Ventilating Engineers indicates that 71 deg. "effective temperature" is the optimum for

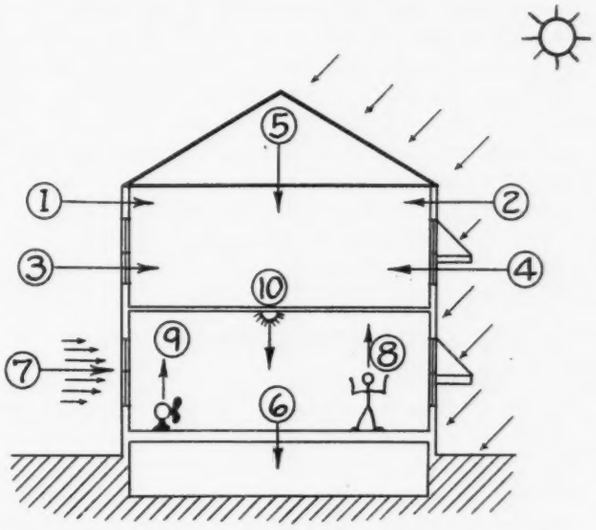


Fig. 2—Sketch showing components of the cooling load in an average residence.

summer comfort. However, in order to minimize the operating cost and also to reduce the possibility of obtaining "cold shock" and "heat shock" when entering and leaving a cooled structure, the design value for indoor "effective temperature" has very often been made greater than 71 deg., and is frequently stated as 73 or 74 deg. These values were found quite satisfactory in the tests conducted in the Research Residence. Table 1 shows the indoor dry-bulb temperature and the accompanying relative humidity which is necessary in order to maintain an indoor "effective temperature" of 73 deg.

TABLE 1

Indoor Temperatures and Relative Humidity

(Values shown are for an effective temperature of 73.0 deg. as given by the A. S. H. and V. E. Comfort Chart)

Dry-Bulb Temperature, Deg. F.	Accompanying Relative Humidity, Per Cent	Wet-Bulb Temperature, Deg. F.	Enthalpy, i_1, B.t.u. Per Lb. Air
76.2	70	69.2	33.28
77.3	60	67.5	31.91
78.6	50	65.8	30.58
80.2	40	63.9	29.15
82.0	30	61.8	27.62

For low humidity systems (dehydration or absorption types), for places of short occupancy, and for extremely dry climates, indoor dry-bulb temperatures of 80 deg. F. and even higher have been specified. On the other hand, cooling systems which utilize well water at a temperature of about 70 deg. F. will produce fairly high relative humidities, and hence a corresponding decrease of a few degrees in design dry-bulb temperature becomes necessary.

In this connection it is of some interest to observe that the function of a winter air conditioning system is to *add* heat and moisture to the structure, whereas the primary function of a summer air conditioning system is to *remove* heat and moisture from the structure. In the latter case, however, the indoor relative humidity that can be attained is definitely related to the type of unit used and the temperature and characteristics of the cooling coil. Hence, in selecting a suitable dry-bulb temperature to maintain in the structure, some account must be taken of the relative humidities that can be produced with the given type of cooling plant.

For general design purposes the following values are recommended for use:

Indoor Dry-bulb temperature = 78.0 deg. F.
Indoor Relative humidity = 50 per cent.
Indoor Wet-bulb temperature = 65.3 deg. F.
Enthalpy = 30.19 B. t. u. per lb.

Outdoor Design Temperatures and Humidity

Design values for outdoor temperatures shown in Table 2, which summarizes values given in the A. S. H. V. E. Guide, are not maximum temperatures for the locality. The design values represent temperatures from 5 to 15 deg. F. lower than the maximum temperatures. For example, for Urbana, Illinois, the design values commonly accepted are:

Dry-bulb temperature = 95 deg. F.
Wet-bulb temperature = 75 deg. F.
Relative humidity = 38.5 per cent.

TABLE 2

Outdoor Dry-bulb and Wet-bulb Temperature

(Values based on A. S. H. V. E. Guide)

Location Cities and States	Dry-Bulb Deg. F.	Wet-Bulb Deg. F.	Approximate Enthalpy, Btu. per Lb. of Air, i_o	Density, Lb. per Cu. Ft.
Portland, Ore.; Spokane; San Francisco	90	65	29.96	0.072
Vermont; Maine; New Hampshire; Los Angeles; Asheville	90	73	36.60	0.071
Denver; Boise; Helena; Reno; Salt Lake City; Wyoming	95	65	29.96	0.071
Connecticut; Georgia; Illinois; Indiana; Iowa; Kentucky; Mass.; Mich.; Minn.; Nebr.; N. Y.; N. D.; Cleveland; Pittsburgh; R. I.; S. D.; Tenn.; W. Va.; Wisc.	95	75	38.46	0.071
Alabama; Little Rock; Delaware; Dist. of Col.; Florida; New Orleans; Maryland; Mississippi; N. J.; Cincinnati; Phila.; Charleston; Memphis; Galveston; Houston; Virginia	95	80	43.51	0.071
Wichita; Kansas City; Oklahoma City	100	75	38.46	0.070
Dallas; San Antonio	100	80	43.51	0.070
Phoenix	105	75	38.46	0.070

The records of the Urbana weather station indicate that the maximum dry-bulb temperature during the past 50 years was 108 deg. F. and that temperatures exceeding 100 deg. F. are experienced about once or twice yearly. Similarly, maximum wet-bulb temperatures exceeding 80 deg. F. have been observed accompanying such high dry-bulb temperatures. As shown in Fig. 3 a design value of 95 deg. F. dry-bulb temperature and 38.5 per cent relative humidity (represented by the cross) has been exceeded on numerous occasions during the nine-year period indicated in the figure. However, since such extreme temperatures are of short duration, usually existing for only a few hours, design values approximately 10 deg. F. lower have been in common use.

In this connection the actual experience in the Research Residence is of great interest. The Residence cooling plant, which was selected from load calculations based upon these design temperatures, was sufficient in capacity to take care of the most extreme temperatures and humidities ever recorded in the locality.

Heat Transmission Through Walls

The procedure in calculating the heat transmitted through the walls under summer conditions is sim-

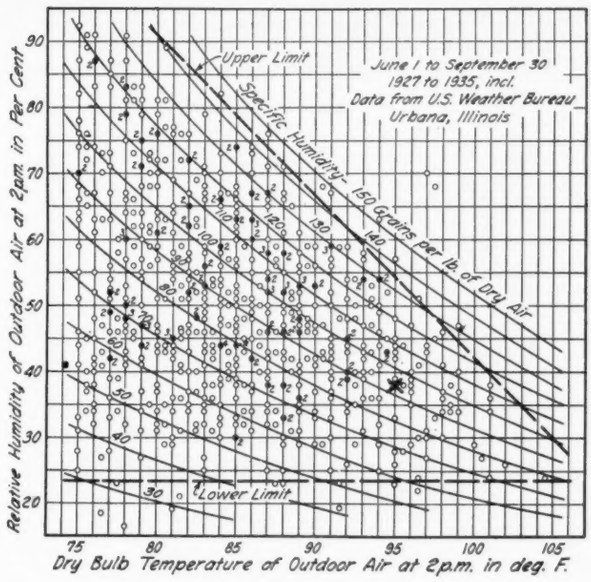

Upper Limit
June 1 to September 30
1927 to 1935, incl.
Data from U.S. Weather Bureau
Urbana, Illinois
Specific Humidity — 150 Grains per lb. of Dry Air
Lower Limit
Relative Humidity of Outdoor Air at 2pm in Per Cent
Dry Bulb Temperature of Outdoor Air at 2p.m. in deg. F.

Fig. 3—Outdoor dry bulb temperatures and accompanying relative humidities as recorded at Urbana, Ill. (From U. of I. Bulletin 290.)

ilar to that for calculating the heat transmitted under winter heating conditions. That is, the hourly heat transmission through the walls which are *not exposed* to the sun is:

Item 1.

$$H = A_s\ U\ (t_o - t_i) \quad \ldots\ldots(1)$$

in which, A_s = Shaded net wall area, in sq. ft.
U = Overall coefficient of heat transmission for the wall, in B.t.u. per hr. per sq. ft. per deg. F. difference in temperature.
t_o = Outdoor dry-bulb *design* temperature, in deg. F.
t_i = Indoor dry-bulb *design* temperature, in deg. F.

As shown in Appendix A of Bulletin 305, the hourly heat transmission through walls exposed to the sun is:

Item 2.

$$H_w = A_e\ U\ (t_o - t_i) + \frac{A_e\ U\ e\ I}{f_o} \quad \ldots\ldots(2)$$

in which, H_w = Heat transmitted through walls, B.t.u. per hr.
A_e = Exposed net wall area, in sq. ft. The shading effect of trees, house, and awnings should be considered.
e = Coefficient of absorption of solar radiation, working values of which are:
0.4 for light colored surfaces,
0.7 for medium dark surfaces, and
0.9 for very dark surfaces.
I = Solar intensity normal to the surface, in B.t.u. per sq. ft. per hr.
f_o = Outside surface coefficient = 6.0
U, t_o, t_i = as in equation 1.

Items 1 and 2 can be combined so that the total heat transmitted through all wall surfaces, shaded or exposed, is equal to:

$$H_w = A_t\ U\ (t_o - t_i) + \frac{A_e\ U\ e\ I}{f_o} \quad \ldots\ldots(2a)$$

in which, A_t = Total wall area, $A_s + A_e$

In Equation 2a the second term on the right hand side of the equation can be considered as the additional heat gain resulting from the sun effect on the exposed walls.

Equation 2a can be simplified to:

$$H = A_t\ U\ (t_o - t_i) + A_e\ (\text{Factor})\ I \quad \ldots\ldots(2b)$$

in which, $\text{Factor} = \frac{U_e}{f_o}$ and may be obtained from Fig. 4 and "I" may be estimated from Table 3.

Example.

Find heat gain for 1 sq. ft. of white wall with south exposure (A_e) and 1 sq. ft. of wall on east wall (A_s) at 2 p. m. Latitude of locality = 40 degrees N.

$A_t = A_s + A_e = 1 + 1 = 2$ sq. ft.
U value = 0.25, $t_o = 95$, $t_i = 78$.
Factor= 0.017 from Fig. 4.
I = 77 from Table 3, second column.

Solution.

$H = 2\ (0.25)\ (95 - 78) + 1\ (0.017)\ (77)$
$= 8.5 + 1.3 = 9.8$ B.t.u. per hr.

TABLE 3

Solar Radiation, I, Impinging on Wall in B.t.u. per sq. ft. per hr.

Latitude in Degrees	Position of Wall				
	Facing South	Facing South-west	Facing West	Facing North-west	Horizontal Surface
30	31	122	141	79	265
35	55	139	143	60	264
40	77	156	143	46	258
45	98	171	144	33	251

(These values are for 2 p. m. on July 21.) and based on data in ASHVE Guide.

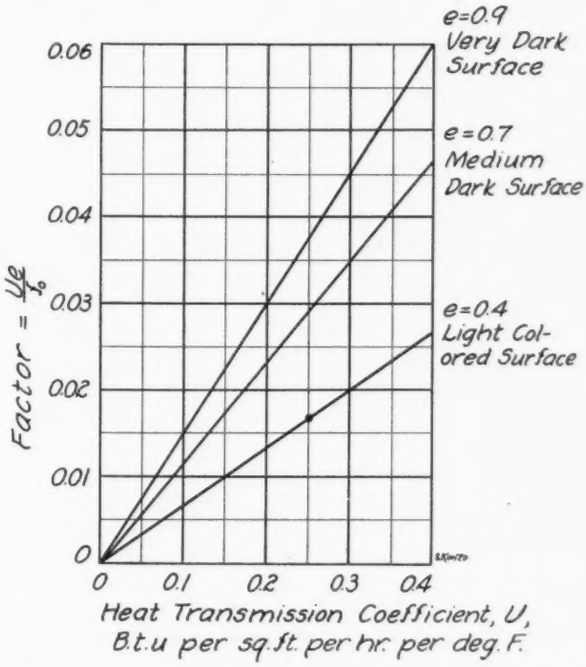


Fig. 4—Factor to be multiplied by solar intensity (I) for determining sun effect on walls. H sun = Factor × Intensity.

Item 3. Heat Transmission Through Windows and Doors Not Exposed to Sun.

This item can be calculated from the equations:

$$H_g = A_g U_g (t_o - t_i) \quad \ldots\ldots (3)$$

and

$$H_d = A_d U_d (t_o - t_i) \quad \ldots\ldots (3a)$$

in which, H_g and H_d are in terms of B.t.u. per hr.

A_g and A_d are glass area and door area, in sq. ft.

U_g and U_d are coefficients of heat transmission through glass and door. For example, $U_g = 1.13$ for single glass.

Item 4. Heat Transmission Through Windows Exposed to Sun.

The heat transmitted through a bare window exposed to solar radiation is:

$$H_g = A_g I_g \quad \ldots\ldots (4)$$

in which, I_g is the solar radiation transmitted through glass. Values of I_g are given in Table 4 for 2 p. m. Similar values for other hours of the day and for a greater number of orientations of the glass are given in the A.S.H.V.E. Guide.

TABLE 4

Solar Radiation, I_g, Transmitted by Windows in B.t.u. per sq. ft. per hr.

	Position of Glass				
Latitude in Degrees	Facing South	Facing South-west	Facing West	Facing North-west	Hori-zontal Surface
30	12	85	103	47	231
35	27	101	104	32	230
40	45	117	104	22	225
45	63	134	106	13	217

(These values are for 2 p. m. on July 21) and based on data in ASHVE Guide.

(These values apply only to bare windows. For windows equipped with shades and awnings see Table 5.)

The heat transmitted through sun-exposed windows, which are equipped with appurtenances such as awnings, Venetian blinds, and shades can be estimated from the equation:

$$H_g = A_g \text{ (Ratio) } I \quad \ldots\ldots (4a)$$

in which, Ratios have been established by tests at the A.S.H.V.E. Laboratory as shown in Table 5.

I = solar radiation, values of which are given in Table 4 for 2 p. m.

TABLE 5

Ratios for Shades and Awnings

0.28 for canvas awnings.

0.58 for Venetian blinds on inside fully covering window, and

0.68 for buff shades, half drawn.

Item 5. Heat Transmission Through Ceilings.

In the case of a ceiling which is protected from the outdoors by an intervening attic space, the heat transmission through the ceiling may be estimated from the equation:

$$H_c = A_c U_c (t_a - t_i) \quad \ldots\ldots (5)$$

in which t_a is the attic air temperature, in deg. F.

Data upon which to estimate the attic temperature for all types of roof and ceiling construction are meager. Maximum attic air temperatures, of short duration, as high as 120 deg. F. have been reported on days in which the maximum outdoor temperature did not exceed 100 deg. F. For ordinary residential type roof construction, such as that in the Research Residence, a design attic air temperature approximately 10 to 15 deg. F. higher than the design outdoor air temperature will probably serve as a working value, until additional data are obtained. Hence, if $t_o = 95$ deg. F., t_a may be assumed as $95 + 15 = 110$ deg. F.

In the case of ceiling construction without an intervening attic space, as in flat deck factory and office roofs, and in some residential high-arch ceilings, the heat transmission can be estimated from the equation:

$$H_c = A_c U_c (t_o - t_i) + \frac{A_c U_c e I}{f_o} \quad \ldots\ldots (5a)$$

This equation is identical to equation 2 for sun-exposed walls and may be reduced to the same form as equation 2b.

$$H_c = A_c U_c (t_o - t_i) + A_c \text{ (Factor) } I \quad \ldots\ldots 5b)$$

in which, Factor may be obtained from Fig. 4, and "I" from Table 3 (last column is for flat-deck roofs).

Item 6. Heat Transmission Through Floor.

For those cases in which the temperature of the space below the floor is at or below the design indoor temperature, the heat transmission through the floor is zero or negative, and hence may be safely neglected in the heat gain calculations. If, however, the space below the floor is freely exposed to the outdoor air the heat gain through the floor may be calculated from the general equation:

$$H_f = A_f U_f (t_o - t_i) \quad \ldots\ldots (6)$$

Item 7. Heat Brought in by Infiltration or Ventilation Air.

The first step in determining the heat gain from this source is to determine the quantity of air in cu. ft. per hr. brought into the indoors from the outdoors. The introduction of warm, moist air (either by infiltration or by ventilation) through the cooling unit and into the structure is accompanied by the escape of a corresponding weight of cooler and drier air from the indoors to the outdoors. In practically every case of comfort cooling some positive means of introducing ventilation air into the structure must be provided. The quantity of air brought in by infiltration is far too variable and unreliable to be satisfactory.

In the Research Residence the positive introduction of one air change of outdoor air per hour was found to give most satisfactory results from the standpoint of odor removal. In other types of cooling applications, such as restaurants and offices, the air change method may not be as satisfactory in estimating the required amount of air for ventilation purposes. The minimum outdoor air requirement for the removal of objectionable body odors has been tentatively established by the Harvard School of Public Health as varying from

(Continued on page 110)

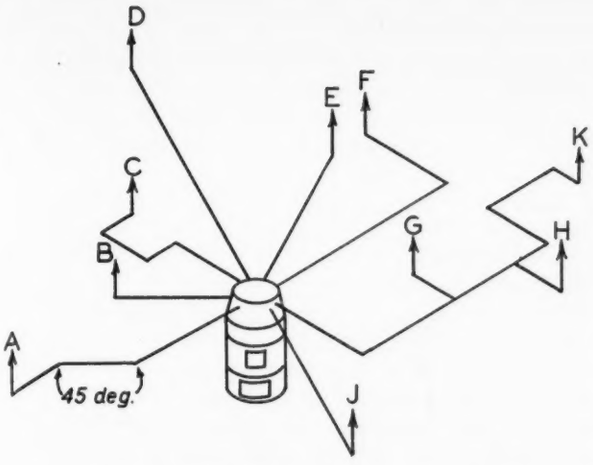


Fig. 1—Above—A simple, single-pipe system for which pipe sizes are selected from precalculated tables. At right—Data sheet for the system suggested for use with precalculated tables.

1. Register	A	B	C	D	E	F	G	H	J	K
2. Length of run, feet	13	4	10	12	7	15	14	20	10	27
3. Temperature drop, degrees	7	2	5	6	4	8	7	10	*8	*19
4. Register temperature corresponding to 150-degree bonnet temperature...	143	148	145	144	146	142	143	140	142	131
5. Register temperature to nearest 5 degrees	145	150	145	145	145	140	145	140	140	130
6. Table No.	47	48	47	47	47	46	47	46	46	44
7. Number of 90-degree elbows	2	1	4	1	1	2	3	3	1	5
8. Feet to allow for elbows	20	10	40	10	10	20	30	30	10	50
9. Equivalent total length of run, (Item 2) + (Item 8)	33	14	50	22	17	35	44	50	20	77
10. Velocity from Fig. 2	600	650	550	650	650	600	550	550	650	450
11. Heat requirement, Mbh (assumed to have been figured)	7.5	9	15	8	4.5	20	13	9	5.5	10
12. Duct area, square inches	24	25	52	24	13	67	45	33	17	51
13. Cfm at 70 degrees.	87	98	174	93	52	247	150	111	68	143

*See explanation in text.

By G. A. Voorhees

Precalculated Engineering

THE last preceding article (February) outlined a method for determining temperatures at the different registers in a building when the *average* register temperature has been established.

The present installment will show how to determine the required duct area for any given combination of (1) register temperature and (2) air velocity in the duct. Again it should be emphasized that there is no generally accepted rule for determining either the temperature drop in the duct between the heater and the register or the air velocity (when the simple and practical velocity method of duct design is used).

To further illustrate different methods that may be, and are used by various engineers, assume in our present example that a uniform rate of temperature drop of one-half degree per foot of duct is to be used with exceptions applied to ducts where the rate of temperature drop will be higher than the average for the job as will be explained later in the text.

If the distances in feet from the furnace bonnet to the various registers are as shown in Item 2 of the tabulation accompanying Fig. 1, it is evident that with a uniform temperature drop of one-half degree per running foot of pipe, the difference between the bonnet temperature and the temperature at each register will be as shown in Item 3 for runs leading to registers A to H inclusive.

For ducts supplying registers J and K let it be assumed that there are "special" conditions which indicate that a higher rate of temperature drop should be allowed. Suppose, for example, that the pipe to the register J runs through an unheated coal cellar and that judgment dictates that an average rate of temperature drop for this entire run should be about 50% higher to allow for the chilling effect of the unheated coal bin. Then for this ten foot run, a rate of 0.75 degree per foot would be assigned instead of 0.5 degree and the total drop would be $0.75 \times 10 = 8$ degrees.

Of the 27 feet of duct from the bonnet to register K, suppose that 16 feet are within the basement and that the remaining 11 feet are in a cold, unexcavated space. Assume that the loss of heat from the duct to the surrounding air will be twice as great in the cold space as in the basement proper, and we have:

16 feet at 0.5 degree per foot = 8 degrees
11 feet at 1 degree per foot = 11 degrees

Total .....19 degrees

It was mentioned in a previous article that some designers assign a definite bonnet temperature for a given job and from that, determine the temperature at each register. Following that method in this case, let it be assumed that the bonnet temperature is 150 degrees. Then by deducting from 150, the temperature drop for each run as shown in Item 3, we get the register temperatures shown in Item 4 of the tabulation.

Since it is customary and convenient to work with

register temperatures in 5 degree steps, we convert the temperatures of item 4 into those shown in Item 5 which give the register temperatures to the nearest 5 degrees as our basis for design.

Item 6 shows for convenience, the numbers of the accompanying tables corresponding to the register temperatures in Item 5.

These tables Nos. 40 to 49 inclusive, give the required duct areas for the register temperature appearing at the top of each table and for the room heat losses in thousands of Btu per hour (Mbh) in the left-hand column. To select the required duct size from the table it is necessary to know, not only the heat loss of the room, but also the air velocity in the duct.

Precalculated Duct Sizes

There are an unlimited number of ways which might be used to determine this velocity. The precise method of course, is by use of the friction pressure chart, but we have been considering in preceding installments the use of the much simpler "velocity" method of duct sizing and will therefore continue on this simplified basis.

In the January issue the velocities recommended by the American Society of Heating and Ventilating Engineers were given. Those velocities applied primarily to a trunk line system and many practical designers have adopted a wide variety of methods for determining velocities for the simpler individual pipe systems. It is important to emphasize again that all such velocities are more or less arbitrary and are chosen by the plant designer on the basis of his experience. After all, it is not so important *what* method is used so long as it gives results that work out well in practice.

For an individual pipe system, especially for jobs having all ducts about the same length, many designers size all the pipes for the same velocity. Others prefer to vary the velocity, not only according to the length of the duct, with lower velocities in longer ducts, but also taking into account the number of elbows and angles in each run since every such change in direction of air flow creates turbulence which in turn tends to retard the flow.

One common practice is to assume that each 90-degree elbow is equivalent in friction or retarding effect to ten running feet of straight pipe.

Item 7 of the tabulation shows the number of 90-degree turns, the two 45-degree angles in run A being equivalent to one elbow.

Allowing ten feet of equivalent pipe length for each elbow, Item 8 shows the addition to make to each run and Item 9 give the total equivalent lengths.

Having determined the equivalent lengths of the runs, the next step is to assign a corresponding velocity to each run, based on these equivalent lengths.

If we establish the highest and lowest velocities wanted in the system, we can use them as a basis for assigning a definite air velocity to each duct depending on its equivalent length.

Precalculated Pipe Velocities

Suppose for example, we decide that the highest air velocity in the system must be less than 700 feet per minute. That becomes our theoretical maximum. Suppose further, that our judgment based on experience, indicates that a velocity of 400 fpm is satisfactory for a leader having an equivalent length of 100 feet. This then becomes our minimum.

With these velocity limits of 700 fpm and 400 fpm and an assumed maximum equivalent duct length of 100 feet, we construct a chart (Fig. 2) as follows:

Lay off a horizontal scale of duct lengths ranging from zero to 100 feet. This is the scale at the bottom of the chart. From the zero point on this horizontal scale, lay off a vertical scale of velocities ranging from the minimum velocity of 400 up to the maximum velocity of 700 fpm. Then draw the graph (diagonal line) as shown in the figure connecting 700 on the velocity scale and 100 on the duct length scale.

The tabulation shows that the equivalent length of duct from bonnet to register A is 33 feet. Locate 33 on the horizontal scale on the bottom of the chart and project vertically upward to the point A where this projection line intersects the graph. From this point A, project horizontally to the left to the velocity scale and it is seen that the design velocity for the duct supplying register A would be 600 fpm. In a similar manner locate the equivalent length of each of the runs

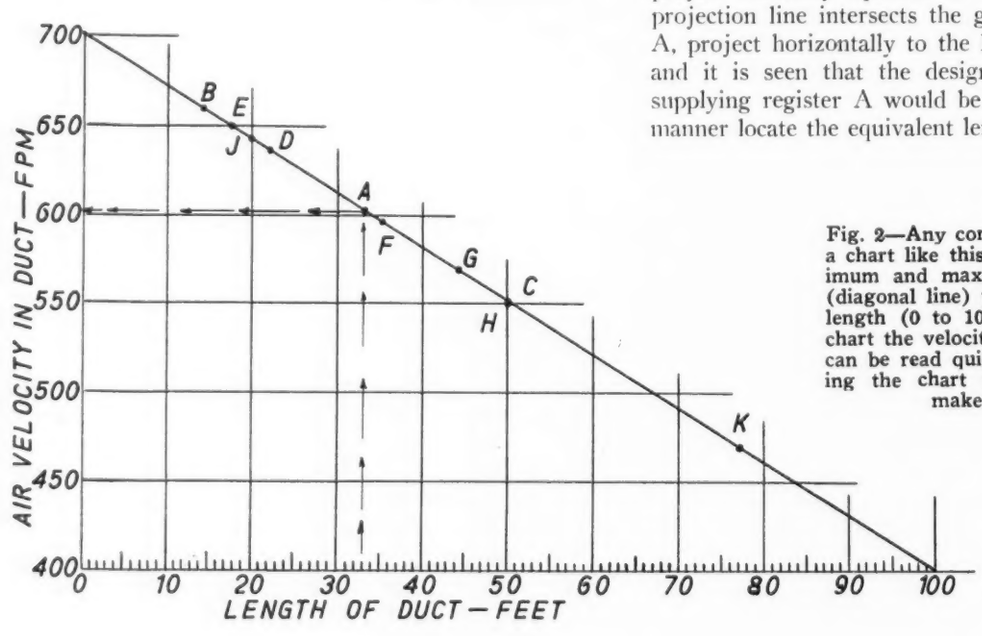


Fig. 2—Any contractor can prepare a chart like this which shows minimum and maximum air velocities (diagonal line) plotted against pipe length (0 to 100 feet). From this chart the velocity in any given pipe can be read quickly. In constructing the chart the divisions must make squares.

on the bottom scale and determine the corresponding velocities to the nearest 50 fpm. These velocities are entered as Item 10.

Any other desired maximum and minimum velocities can be chosen and the corresponding velocities for each of the runs determined by constructing a chart. Let it be repeated again, the exact method used is *relatively* unimportant. It's for the designer to decide on the basis of his experience, what limiting velocities he prefers. The chart shown in Fig. 2 and the corresponding velocities which have been listed for the runs in the example under consideration show only one of many sets of values which might be derived. The important thing in any case is that such a method "automatically" makes *some* correction for friction pressure loss by assigning lower velocities to the longer ducts.

Having determined the register temperature for each outlet (Items 4 and 5) and noted the corresponding table (Item 6), the next step is to list the heat requirement of each room. Assuming that the heat losses have been calculated or determined from pre-calculated tables, they are listed as Item 11 (in thousands of Btu) and taken in connection with the velocities in Item 10, they enable us to read from Tables 40 to 51 inclusive, the required duct areas.

Run K for example, supplies a room having a heat loss of 10,000 Btu per hour (Mbh = 10) and Item 6 shows that Table 44 applies. Locate in the left hand column of that table, the heat loss of the room, 10, and in the same horizontal line and in the column headed 450 fpm (Item 10), it is seen that the required duct area is 51 square inches. In a like manner the areas of the remaining ducts are found (Item 12).

For convenience in finding the blower capacity required, each table has in its extreme right hand column, the air volume (cfm) *measured at 70 degrees* required to deliver the quantities of heat shown in the left hand column of the table. These are entered as Item 13 in the tabulation and their total is 1,223 cfm. Although it is customary to assume that return air leaves a room at a temperature of 65 degrees, furnace blowers have their capacity ratings based on so-called "standard air" at 70 degrees.

Although space does not permit going into the subject at this time, it is evident that the method outlined in this article, lends itself readily to the determination of the total pressure loss of the system (static pressure). This is true because pressure losses in ducts are governed by three factors which this method gives, namely:

(1) size of duct, usually expressed as diameter of round pipe
(2) equivalent length of duct which is the actual length plus allowances for elbows and angles
(3) air velocity within the duct

(Tables 45 to 51, inc., will appear in May)

TABLE No. 40

REGISTER TEMPERATURE—110 DEG.

	Air Velocity											
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	CFM at Reg. Temp.	CFM at 70 Deg.
Heat Loss of Room Mbh	Required Area, Square Inches											
4	36	32	28	25	23	21	20	18	17	16	89	82
4.5	41	36	32	29	26	24	22	21	19	18	100	92
5	46	40	35	32	29	27	25	23	21	20	111	102
5.5	50	44	39	35	32	29	27	25	23	22	122	112
6	55	48	42	38	35	32	30	27	26	24	133	123
6.5	59	52	46	41	38	35	32	30	28	26	144	133
7	64	56	50	45	41	37	34	32	30	28	156	143
7.5	68	60	53	48	44	40	37	34	32	30	167	153
8	73	64	57	51	46	43	39	37	34	32	178	163
8.5	77	68	60	54	49	45	42	39	36	34	189	173
9	82	72	64	57	52	48	44	41	38	36	200	184
9.5	86	76	67	61	55	51	47	43	40	38	211	194
10	91	80	71	64	58	53	49	46	43	40	222	204
11	100	88	78	70	64	58	54	50	47	44	244	224
12	109	96	85	76	70	64	59	55	51	48	266	245
13	118	103	92	83	75	69	64	59	55	52	289	265
14	127	111	99	89	81	74	69	64	60	56	311	286
15	137	119	106	96	87	80	74	68	64	60	333	306
16	146	127	113	102	93	85	79	73	68	64	355	326
17	155	135	120	108	99	90	83	78	72	68	377	347
18	164	143	127	115	104	96	88	82	77	72	400	367
19	173	151	135	121	110	101	93	87	81	76	422	388
20	182	159	142	127	116	106	98	91	85	80	444	408
21	191	167	149	134	122	112	103	96	89	84	466	428
22	200	175	156	140	128	117	108	100	94	88	488	449
23	209	183	163	147	133	122	113	105	98	92	511	469
24	218	191	170	153	139	127	118	109	102	96	533	490
25	228	199	177	159	145	133	123	114	106	100	555	510

Tables of Pipe Sizes—350 to 800 FPM; 5 to 25 MBH; By Register Temperature

TABLE No. 41

Register Temperature—115 Deg.

	Air Velocity											
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	CFM at Reg. Temp.	CFM at 70 Deg.
Heat Loss of Room Mbh	Required Area, Square Inches											
4	33	29	26	23	21	19	18	17	15	14	80	74
4.5	37	33	29	26	24	22	20	19	17	16	90	83
5	41	36	32	29	26	24	22	21	19	18	100	93
5.5	45	40	35	32	29	27	25	23	21	20	110	102
6	50	43	39	35	32	29	27	25	23	22	120	111
6.5	54	47	42	38	34	31	29	27	25	24	130	121
7	58	51	45	41	37	34	31	29	27	25	140	130
7.5	62	54	48	43	40	36	33	31	29	27	150	139
8	66	58	52	46	42	39	36	33	31	29	160	148
8.5	70	62	55	49	45	41	38	35	33	31	170	158
9	74	65	58	52	47	43	40	37	35	33	180	167
9.5	79	68	61	55	50	46	42	39	37	34	190	176
10	83	72	64	58	53	48	45	41	39	36	200	185
11	91	80	71	64	58	53	49	46	42	40	220	204
12	99	87	77	69	63	58	54	50	46	43	240	222
13	107	94	84	75	69	63	58	54	50	47	260	241
14	116	101	90	81	74	68	62	58	54	51	280	260
15	124	109	97	87	79	72	67	62	58	54	300	278
16	132	116	103	93	84	77	71	66	62	58	320	297
17	140	123	109	98	90	82	76	70	66	62	340	315
18	149	130	116	104	95	87	80	75	69	65	360	334
19	157	138	122	110	100	92	85	79	73	69	380	352
20	165	145	129	116	105	97	89	83	77	72	400	371
21	173	152	135	122	111	101	94	87	81	76	420	389
22	182	159	142	127	116	106	98	91	85	80	440	408
23	190	167	148	133	121	111	103	95	89	83	460	426
24	198	174	155	139	126	115	107	99	93	87	480	445
25	207	181	161	145	132	121	112	104	97	91	500	464

TABLE No. 42

Register Temperature—120 Deg.

	Air Velocity											
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	CFM at Reg. Temp.	CFM at 70 Deg.
Heat Loss of Room Mbh	Required Area, Square Inches											
4	30	27	24	21	19	18	16	15	14	13	74	68
4.5	34	30	27	24	22	20	18	17	16	15	83	76
5	38	33	30	27	24	22	21	19	18	16	93	85
5.5	42	37	32	29	27	24	23	21	19	18	102	93
6	46	40	35	32	29	27	25	23	21	19	111	102
6.5	49	43	38	34	31	29	27	25	23	21	121	110
7	53	47	41	37	34	31	29	27	25	23	130	119
7.5	57	50	44	40	36	33	31	29	27	24	139	127
8	61	53	47	42	39	35	33	30	28	26	148	136
8.5	65	57	50	45	41	38	35	32	30	27	158	144
9	68	60	53	48	44	40	37	34	32	29	167	153
9.5	72	63	56	50	46	42	39	36	34	31	176	161
10	76	67	59	53	48	44	41	38	35	33	185	170
11	83	73	65	58	53	49	45	42	39	37	204	186
12	91	80	71	64	58	53	49	46	42	40	222	203
13	99	86	77	69	63	58	53	49	46	43	241	220
14	106	93	83	74	68	62	57	53	50	46	359	237
15	114	100	89	80	73	66	62	57	53	50	278	254
16	121	106	94	85	77	71	66	61	57	53	296	271
17	129	113	100	90	82	75	70	65	60	56	315	288
18	137	120	106	95	87	80	74	68	64	60	333	305
19	144	126	112	101	92	84	78	72	67	63	352	322
20	152	133	118	106	97	89	82	76	71	66	370	339
21	159	140	124	111	102	93	86	80	74	70	389	356
22	167	146	130	117	106	97	90	84	78	73	407	373
23	175	153	136	122	111	102	94	87	81	76	426	390
24	182	160	142	127	116	106	98	91	85	80	444	407
25	190	166	148	133	121	111	103	95	89	83	463	424

Tables of Pipe Sizes—350 to 800 FPM; 4 to 25 MBH; By Register Temperature

TABLE No. 43

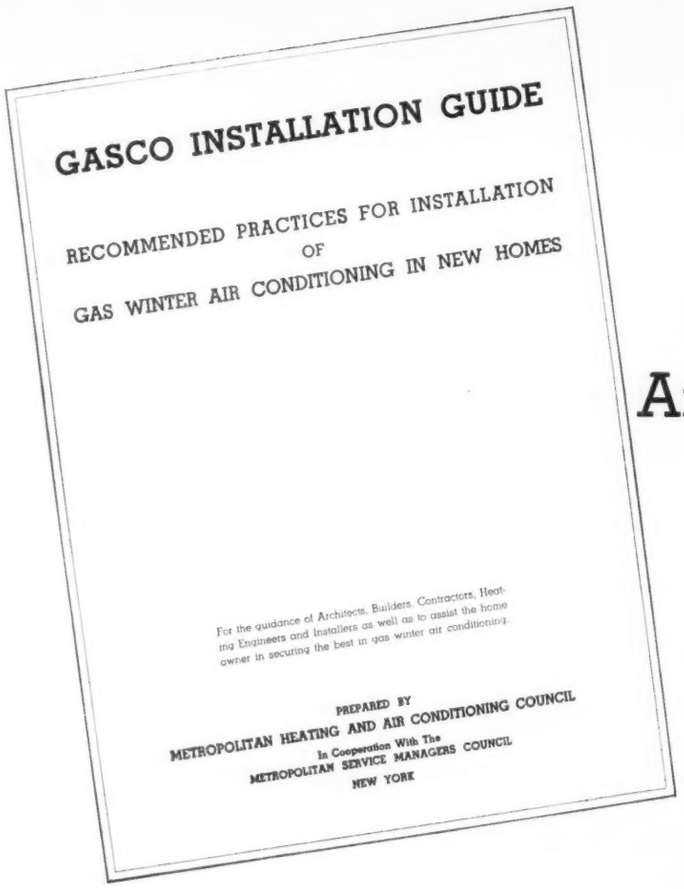
Register Temperature—125 Deg.

	Air Velocity											
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	CFM at Reg. Temp.	CFM at 70 Deg.
Heat Loss of Room Mbh	Required Area, Square Inches											
4	28	25	22	20	18	16	15	14	13	12	68	62
4.5	32	28	25	22	20	18	17	16	15	14	76	69
5	35	31	27	25	22	20	19	18	16	15	85	77
5.5	39	34	30	27	25	22	21	19	18	17	93	85
6	42	37	33	29	27	25	23	21	20	18	102	92
6.5	46	40	35	32	29	27	25	23	21	20	110	100
7	49	43	38	34	31	29	26	25	23	22	119	108
7.5	53	46	41	37	33	31	28	26	25	23	127	115
8	56	49	44	39	36	33	30	28	26	25	136	123
8.5	60	52	46	42	38	35	32	30	28	26	144	131
9	63	55	49	44	40	37	34	32	29	28	153	139
9.5	67	58	52	47	42	39	36	33	31	29	161	146
10	70	61	55	49	45	41	38	35	33	30	170	154
11	77	68	60	54	49	45	42	39	36	34	187	169
12	84	74	65	59	54	49	45	42	39	37	204	185
13	91	80	71	64	58	53	49	46	43	40	221	200
14	98	86	76	69	62	57	53	49	46	43	238	216
15	105	92	82	74	67	61	57	53	49	46	255	231
16	112	98	87	79	71	65	60	56	52	49	272	246
17	119	104	93	83	76	70	64	60	56	52	289	262
18	126	111	98	88	80	74	68	63	59	55	306	277
19	133	117	104	93	85	78	72	67	62	58	323	293
20	140	123	109	98	89	82	76	70	65	61	340	308
21	147	129	114	103	94	86	79	74	69	64	357	323
22	154	135	120	108	98	90	83	77	72	68	374	339
23	161	141	125	113	103	94	87	81	75	71	391	354
24	168	147	131	118	107	98	91	84	78	74	408	370
25	175	154	136	123	112	102	95	88	82	77	425	385

TABLE No. 44

Register Temperature—130 Deg.

	Air Velocity											
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	CFM at Reg. Temp.	CFM at 70 Deg.
Heat Loss of Room Mbh	Required Area, Square Inches											
4	26	23	20	18	17	15	14	13	12	11	64	57
4.5	29	26	23	21	19	17	16	15	14	13	72	64
5	33	29	25	23	21	19	18	16	15	14	80	71
5.5	36	31	28	24	23	21	19	18	17	16	87	79
6	39	34	30	27	25	23	21	20	18	17	95	86
6.5	42	37	33	30	27	25	23	21	20	19	103	93
7	46	40	35	32	29	27	25	23	21	20	111	100
7.5	49	43	38	34	31	29	26	25	23	21	119	107
8	52	46	41	36	33	30	28	26	24	23	127	114
8.5	55	49	43	39	35	32	30	28	26	24	135	121
9	59	51	46	41	37	34	32	29	27	26	143	129
9.5	62	54	48	43	39	36	33	31	29	27	151	136
10	65	57	51	46	42	38	35	33	31	29	159	143
11	72	63	56	50	46	42	39	36	34	31	175	157
12	78	69	61	55	50	46	42	39	37	34	191	171
13	85	74	66	59	54	50	46	43	40	37	207	186
14	91	80	71	64	58	53	49	46	43	40	223	200
15	98	86	76	68	62	57	53	49	46	43	239	214
16	104	91	81	73	66	61	56	52	49	46	254	229
17	111	97	86	78	71	65	60	56	52	48	270	243
18	117	103	91	82	75	69	63	59	55	51	286	257
19	124	108	96	87	79	72	67	62	58	54	302	272
20	130	114	101	91	83	76	70	65	61	57	318	286
21	137	120	106	96	87	80	74	69	64	60	334	300
22	143	126	112	100	91	84	77	72	67	63	350	314
23	150	131	117	105	95	88	81	75	70	66	366	329
24	156	137	122	109	100	91	84	78	73	68	382	343
25	163	143	127	114	104	95	88	82	76	71	398	357


GASCO INSTALLATION GUIDE
RECOMMENDED PRACTICES FOR INSTALLATION
OF
GAS WINTER AIR CONDITIONING IN NEW HOMES
For the guidance of Architects, Builders, Contractors, Heating Engineers and Installers as well as to assist the home owner in securing the best in gas winter air conditioning.
PREPARED BY
METROPOLITAN HEATING AND AIR CONDITIONING COUNCIL
In Cooperation With The
METROPOLITAN SERVICE MANAGERS COUNCIL
NEW YORK

Suggested Standards for Gas-Fired, Winter Air Conditioning Systems

By H. P. Morehouse

Chairman, Sub-Committee on Improved Selling Practice, A. G. A. House Heating and Air Conditioning Committee

THE gas companies, who are members of the Metropolitan Heating and Air Conditioning Council,* have prepared a set of rules outlining recommended practices for the installation of gas winter air conditioning in new homes. The rules are in booklet form and the work is known as the Gasco Installation Guide.

These standards, prepared by a joint committee of the Council and the Metropolitan Service Managers Group, have created such interest throughout the gas industry that the American Gas Association has taken over their distribution on a national basis and is making the book available in quantity to all gas companies, manufacturers and other interested parties, at a nominal cost.

The reason for the preparation of these standards was to bring order out of the chaotic state into which winter air conditioning was falling because of the unorthodox installation practices that were being followed.

As is so often the case with a new art, engineering, care and experience go to make up its early history. Then, when a well deserved popularity has been attained, the vendors vie with each other to cut costs in an effort to get the order. These reductions in sales price are invariably accompanied by a reduction in quality, workmanship and engineering skill. There is a tendency to chisel and cut corners to a point where unsatisfactory results are the unfortunate experience of the innocent buyer.

Such has been the history of gas winter air conditioning in the East. During its early history each installation was carefully and individually engineered. The results were extremely satisfactory. The new art seemed destined to become the standard by which good heating was judged. Gas companies everywhere encouraged this new method of heating because it offered them their best opportunity for getting the new home market. It was the lowest cost system to install. It operated at a lower fuel cost than steam or hot water systems and it had a definite romantic advertising appeal due to its newness and the wide publicity given to its counterpart, summer air conditioning.

It is therefore evident that the utilities cannot afford to see the good name of winter air conditioning blackened by unsatisfactory installations. Such a situation was rapidly approaching when the Gasco Installation Guide committee was formed. There was already a trend on the part of architects, builders and the home buyer, back to other heating systems, particularly forced hot water.

Trouble First Appeared in Low-Cost Home

The low price home and speculative building was the point at which sloppy installation practices first appeared. These practices later spread to the better class home in the headlong dash to cut prices and get the order. To mention but a few of the practices that crept in: Sidewalk deliveries of units with the builder hiring his own sheet metal man. In these cases often no layout was ever made. There was divided responsibility and little supervision. Units were sized wrong, and fans were either too large or too small for the job. Ducts were installed without dampers so that balancing was impossible. Insufficient return area or even a complete lack of return ducts was sometimes encountered. Sheet metal ducts were often improperly run, improperly braced and made of too light material. Units

*Metropolitan Heating and Air Conditioning Council is an organization composed of representatives of the 18 Gas Companies in the Metropolitan New York City Area.

were installed in inaccessible locations for service. There were many other examples of unsatisfactory practices. Most of the dealers participating in these unorthodox practices did not want to do a poor job, but a vicious cycle started somewhere and everyone was afraid to check the practices for fear of losing the order.

The gas utilities standing in a somewhat unbiased position were the only hope for establishing a set of standards which would assure the continued enthusiastic acceptance of winter air conditioning.

Suggested Contract Form

The Gasco Installation Guide was *not* prepared as a CODE OF MINIMUM REQUIREMENTS, but rather as a set of standards through which everyone concerned could be assured of a first-class installation. Its language is that of "suggestions" rather than "demands." Its rules are not ideals toward which we might strive but never reach. There are no fancy theories or unnecessary recommendations. On the contrary the rules follow the standards suggested by such recognized authorities as the American Society of Heating & Ventilating Engineers, The National Warm Air Heating and Air Conditioning Association, National Board of Fire Underwriters, American Gas Association and over one hundred manufacturers of gas fired winter air conditioning equipment. The G. I. G. brings together the ideas of many authorities, applies them specifically to gas fuel and arranges them in a simple form for handy use by builders, architects, dealers, engineers, installers, utilities and the home buyer who is occasionally interested in such details.

The question immediately comes up as to how such a set of rules can be made to work. The policy of policing installation practices is of course something each utility will have to decide upon for themselves. However, the G. I. G. committee offer one possible solution to get the Guide into widespread use. This is a single sheet specification form which may be purchased through the A. G. A. in padded form. This form when signed by the installer is a contract to make the installation according to the precepts of the Gasco Guide. There is room on the form for exceptions to be taken to certain rules. These exceptions are taken in writing and are agreed to in advance between the owner, architect or builder, on the one hand and the dealer or installer on the other.

Such a set of standards reduced to a simple contractual agreement offers an advantage also to the dealer. He knows when he places his bid that he is bidding against a comparable installation by his competitor. His interest in cutting corners is thus to a considerable degree diminished. It is urged that all utilities who adopt the Gasco Installation Guide as their standard, furnish all dealers and installers with extra blank copies of the specification form and also to urge architects, builders and prospective home builders, to insist that a signed specification form accompany each dealer's bid.

SPECIFICATION FORM

of the Gasco Installation Guide of

"Recommended Practices for Installation of Gas Winter Air Conditioning in New Homes"

In submitting the attached quotation for the installation of a gas winter air conditioning system in the residence of:

Name _____

Address _____

City _____

we recommend the following equipment: No. _____

_____ Unit

No. _____ Thermostat

We agree to follow The Gasco Installation Guide of "Recommended Practices For Installation of Gas Winter Air Conditioning in New Homes" which should assure you satisfactory performance of your heating plant.

The following exceptions have been agreed upon between

Mr. _____

(Architect, Owner, Builder)

and the Installer:

_____

_____

_____

_____

_____

_____

_____

_____

Heating Contractor _____

Per _____

[Extra copies of this form are available from your Gas Company]

Provisions of the Guide

We will review here briefly the main subdivisions of the Gasco Installation Guide in order to give the idea of its contents:

I. Equipment approval
II. Heating Unit
  A. Fan and Motor
  B. Size
III. Erection of Furnace
IV. Installation of Furnace
  A. Furnace Room
  B. Accessibility
V. Controls
  A. Thermostat
  B. Furnace Control
  C. Summer Switch
  D. Humidifiers
VI. Air Ducts
  A. General
  B. Supply Ducts
  C. Return Ducts
  D. Dampers
  E. Supports
VII. Registers and Grilles
  A. General
  B. Supply Registers
  C. Return Grilles
VIII. Filters
IX. Electrical Connections
X. Balancing Systems

(*Continued on page* 102)

Weights of Galvanized Iron and Labor Time Required for

Fabricating Common Duct Sections

THIS article completes the series of tables prepared by Mr. Root. The first tables were published in January, followed by additional tables in February and March. The idea behind the tables seems to be understood by all readers—but some questions have been raised as to the ability of the mechanics upon whose time cards the tables are based and some readers have asked if time is allowed for cutting patterns.

As to the mechanics, we understand that the men were "good" mechanics, forming these sections as a daily task; as to patterns, no time is allowed for cutting patterns.

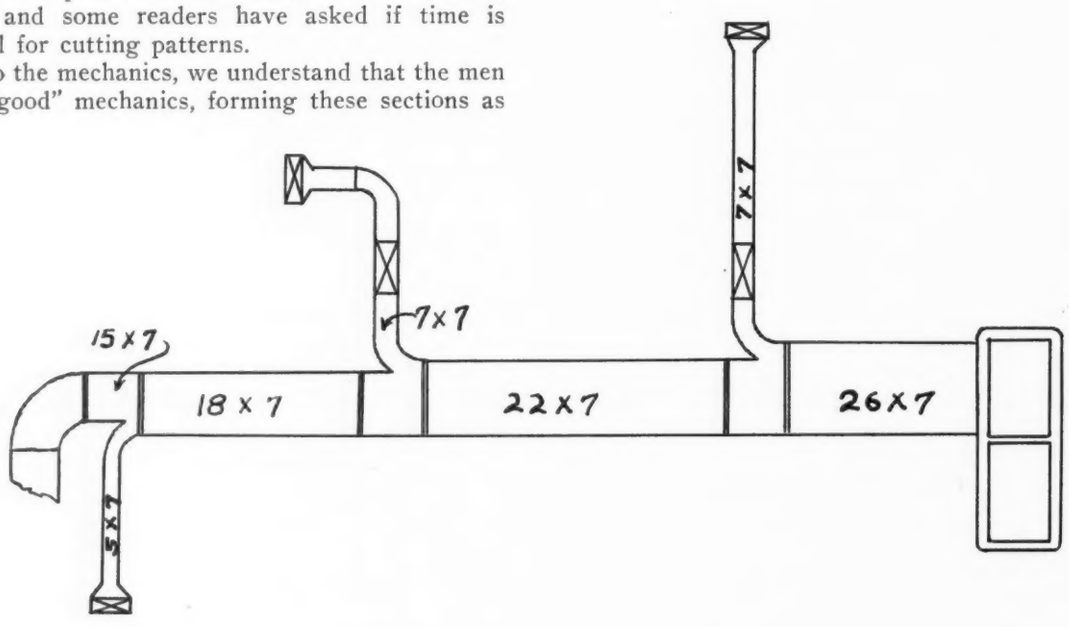
In connection with these tables, Mr. Root, who is Manager, Heating and Air Conditioning Division of the Nelson Company, Detroit, and has been active in establishing the Technical Code, recommends that the heating plan should be designed according to the Technical Code.

In concluding the tables Mr. Root explains a typical application as follows:

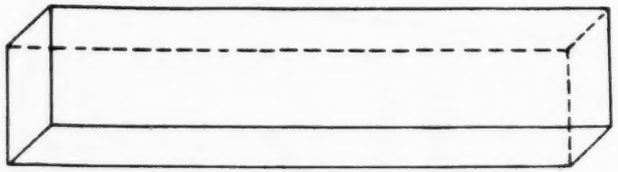
"These charts are published for the purpose of determining the cost of fabricating a duct system, but are not intended to be used as a method of design. The object, of course, is to enable the estimator to arrive at his costs without going too much into detail.

"The location of supplies and returns can be spotted on the basement plan and duct sizes indicated on a single line drawing as suggested in Article 6, Section 1 (a) of the Technical Code. Without going further into detail it is a simple matter to list the various duct sections and in two columns opposite each item indicate the time and weight.

"After all of the material has been listed, the total of these two columns will give the weight of material, including waste, and time required for fabrication. This can best be illustrated by the following section of a duct system and list of material."



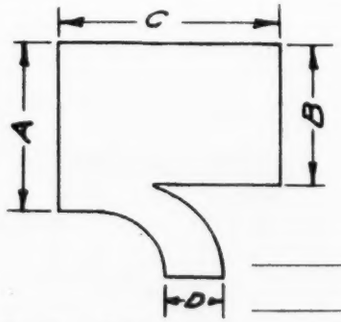
No. of Pieces	Items	Weight, Pounds	Time, Minutes
1	W A Plenum	21.0	60
1	26x7 to 22x7—(7x7 Br.)	10.1	60
1	22x7 to 18x7—(7x7 Br.)	9.3	45
1	18x7 to 15x7—(5x7 Br.)	8.5	45
2	7x7 Vertical Offsets	12.2	80
1	7x7 Ell	3.9	35
1	15x7 Ell	12.4	50
2	7x7 Transitions	6.0	40
1	5x7 Transitions	3.0	20
5′	26x7 Pipe	27.2	30
5′	7x7 Pipe	12.9	30
8′	22x7 Pipe	38.6	30
2′	7x7 Pipe	5.1	20
6′	18x7 Pipe	25.4	30
5′	5x7 Pipe	11.4	30
	Total	207.0	615′: (10 hrs. 15 min).



Weight and Time for Rectangular Ducts per Joint

Depth 12″

	1′		2′		3′		4′		5′		6′		7′		8′	
Width	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time
44	11.4	30′	22.7	30′	34.1	30′	45.5	60′	....	.....	.....	.....	.....	.....	.....	.....
42	11.0	30′	22.0	30′	33.0	30′	44.0	60′	....	.....	.....	.....	.....	.....	.....	.....
40	10.6	30′	21.2	30′	31.8	30′	42.4	60′	....	.....	.....	.....	.....	.....	.....	.....
38	10.2	30′	20.4	30′	30.6	30′	40.8	60′	....	.....	.....	.....	.....	.....	.....	.....
36	9.8	30′	19.7	30′	29.5	30′	39.3	60′	....	.....	.....	.....	.....	.....	.....	.....
34	9.4	30′	18.9	30′	28.3	30′	37.8	60′	....	.....	.....	.....	.....	.....	.....	.....
32	7.1	30′	14.2	30′	21.3	30′	28.4	30′	35.5	30′	42.6	30′	49.7	30′	56.8	30′
30	6.8	30′	13.6	30′	20.4	30′	27.2	30′	34.0	30′	40.8	30′	47.6	30′	54.4	30′
28	6.5	30′	13.0	30′	19.5	30′	26.0	30′	32.5	30′	39.0	30′	45.5	30′	51.9	30′
26	6.2	30′	12.4	30′	18.6	30′	24.8	30′	31.0	30′	37.1	30′	43.3	30′	49.5	30′
24	5.9	30′	11.8	30′	17.7	30′	23.6	30′	29.4	30′	35.3	30′	41.2	30′	47.1	30′
22	5.6	30′	11.2	30′	16.8	30′	22.3	30′	27.9	30′	33.5	30′	39.1	30′	44.7	30′
20	5.3	30′	10.6	30′	15.9	30′	21.1	30′	26.4	30′	31.7	30′	37.0	30′	42.3	30′
18	5.0	30′	10.0	30′	14.9	30′	19.9	30′	24.9	30′	29.9	30′	34.9	30′	39.9	30′
16	4.7	30′	9.4	30′	14.0	30′	18.7	30′	23.4	30′	28.1	30′	32.8	30′	37.4	30′
14	4.4	30′	8.8	30′	13.1	30′	17.5	30′	21.9	30′	26.3	30′	30.7	30′	35.0	30′
12	4.1	30′	8.2	30′	12.2	30′	16.3	30′	20.4	30′	24.5	30′	28.5	30′	32.6	30′
10	3.8	30′	7.6	30′	11.3	30′	15.1	30′	18.9	30′	22.7	30′	26.4	30′	30.2	30′
9	3.6	20′	7.2	20′	10.9	20′	14.5	30′	18.1	30′	21.7	30′	25.4	30′	29.0	30′
8	3.5	20′	6.9	20′	10.4	20′	13.9	30′	17.4	30′	20.8	30′	24.3	30′	27.8	30′
7	3.3	20′	6.6	20′	10.0	20′	13.3	30′	16.6	30′	19.9	30′	23.3	30′	26.6	30′
6	3.1	20′	6.3	20′	9.5	20′	12.7	25′	15.9	30′	19.0	30′	22.2	30′	25.4	30′.
5	3.0	20′	6.0	20′	9.1	20′	12.1	25′	15.1	30′	18.1	30′	21.1	30′	24.2	30′
4	2.9	20′	5.7	20′	8.6	20′	11.5	25′	14.3	25′	17.2	30′	20.1	30′	23.0	30′



Reducing Joint with One Branch

Depth of Duct 12″

C	27″		24″		21″		18″		17″	
	D	A-B	D	A-B	D	A-B	D	A-B	D A-B	D A-B
	10x12	(6″)	9x12	(5″)	8x12	(4″)	7x12	(4″)	6x12-3″	5x12-2″.
A	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time
44x12	20.9	90′	19.5	90′	19.5	90′	19.5	90′	19.5	90′
42x12	20.4	90′	19.0	90′	19.0	90′	19.0	90′	19.0	90′
40x12	19.8	90′	18.4	90′	18.4	90′	18.4	90′	18.4	90′
38x12	19.2	90′	17.8	90′	17.8	90′	17.8	90′	17.8	90′
36x12	18.6	90′	17.3	90′	17.3	90′	17.3	90′	17.3	90′
34x12	18.0	75′	16.7	75′	16.7	75′	16.7	75′	16.7	75′
32x12	13.7	75′	12.6	75′	12.6	75′	12.6	75′	12.6	75′
30x12	13.2	60′	12.2	60′	12.2	60′	12.2	60′	12.2	60′
28x12	12.8	60′	11.8	60′	11.8	60′	11.8	60′	11.8	60′
26x12	12.3	60′	11.4	60′	11.4	60′	11.4	60′	11.4	60′
24x12	11.9	45′	11.0	45′	11.0	45′	11.0	45′	11.0	45′
22x12	11.4	45′	10.5	45′	10.5	45′	10.5	45′	10.5	45′
20x12	11.0	45′	10.1	45′	10.1	45′	10.1	45′	10.1	45′
18x12	10.5	45′	9.7	45′	9.7	45′	9.7	45′	9.7	45′
16x12	10.0	45′	9.3	45′	9.3	45′	9.3	45′	9.3	45′
14x12	9.7	30′	8.8	30′	8.8	30′	8.8	30′	8.8	30′
12x12	9.2	30′	8.4	30′	8.4	30′	8.4	30′	8.4	30′
10x12	.....	.....	8.0	30′	8.0	30′	8.0	30′	8.0	30′
9x12	.....	.....	.....	.....	7.3	30′	7.3	30′	7.3	30′
8x12	.....	.....	.....	.....	.....	.....	6.9	30′	6.9	30′
7x12	.....	.....	.....	.....	.....	.....	.....	.....	6.5	30′

HEAT STIFLES FAMILY!

Low Cost Relief From Heat

Low Operating Cost

Electricity is Cheap!

AMERICAN BLOWER HOME CONDITIONERS

Keep You Comfortable

By Means of

Attic Ventilation

Buy Comfort Cooling

Now you can laugh at the "heat wave" forecasts! For the Ventura Home Conditioner gives you a new, positive, practical way of comfort cooling. Cools the entire house by Attic Ventilation at amazingly low cost. This new, improved Home Conditioner drives torrid, superheated air out, draws in the cool outside air. Attractively finished, compact, dependable. Acoustically treated steel housing, motors rubber mounted, all capacity ratings certified. Buy this Conditioner for your home now and enjoy the summer.

Hundreds of Pleased Users

Let us install an attic ventilation system in your home. We are pioneers in this business and are able to point with pride to hundreds of satisfactory installations. We believe that everyone's home is his castle, whether large or small. We also believe that each home owner desires maximum comfort as well as high-quality performance above everything else. The American Blower Corporation, manufacturers of the Ventura Home Conditioner, has been manufacturing air-handling equipment for over 60 years, so it is only natural that practically every office building in Houston using air-conditioning equipment installed American Blower products for the movement of the air.

Installations by Men of Experience

Competent engineers from the American Blower Corporation have carefully trained and supervised our local organization, which is headed by Mr. Pat V. Flynn, formerly of that corporation. We maintain a separate force of experienced men to make the engineering surveys of all installations; also a competent crew that has made hundreds of installations in this city. These men are trained to be courteous, efficient and neat in their work, and for your protection they are fully covered by compensation and liability insurance.

Installed Quickly

Every effort is made to make installations as quickly as possible, as we realize that any work done in a home is an inconvenience to the family. We make a careful study of the construction of your home and take great care that no vital parts of construction are impaired or removed which would in any way weaken the house. We invite you to inspect any of the installations we have made. All of our calculations are based on specifications made to us by the American Blower Corporation.

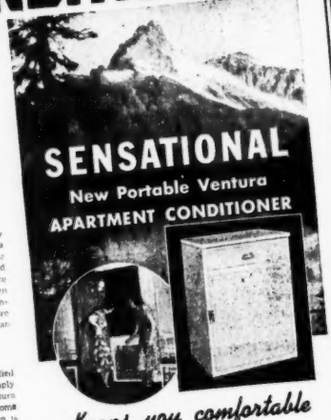
Certified Ratings

The American Blower Ventura ratings are Certified under Standard Tests Code conditions, which simply means that when you buy American Blower Ventura the amount of air delivery required for your home is certified to as being correct. This certification is backed by the name of American Blower Corporation, subsidiary of the American Radiator and Sanitary Manufacturing Company.

Why experiment? Do not be fooled by extremely low prices. Our installations are reasonably priced. The best is the cheapest and you generally get only what you pay for.

Exclusive Dealer

We will be very glad to make a free survey of your home or apartment without obligation. Fill out the coupon below and mail it to us, or simply call us on the telephone



Keeps you comfortable

● Now you can take a vacation from hot, stifling weather all summer long with this sensational new Ventura Apartment Conditioner. A powerful, quietly operating fan of new design is housed in a beautiful white cabinet. Compact, easily moved, no cutting or patching—self contained—delivered all ready to run—no refrigerating machine required. Just set it in a doorway and plug it in like a radio. Enjoy *cool comfort* now with nature conditioned air.

PHONE TODAY FOR DEMONSTRATION!
MAIL THIS COUPON TODAY

Ben Duffie, Inc.,
1015 Westheimer,
Houston, Texas

Gentlemen:

Without obligating me in any way, please have an attic ventilation survey made for me.

Name .....
Address .....
Phone .....

No Down Payment - FHA Terms

BEN DUFFIE

Exclusive Dealer

1015 Westheimer—J-25121 1420 Main—C-7493

Bring Bayshore Breezes Thru Your Windows This Summer with ELECTRIC

ATTIC VENTILATION

Electricity is Cheap!

- FLOOD YOUR HOME WITH COOL NIGHT AIR
- BANISH SLEEPLESS, SWELTERING NIGHTS
- PROVIDE REAL SUMMER COMFORT, CHEAPLY
- ENJOY A NEW MORNING FRESHNESS

HOUSTON LIGHTING & POWER COMPANY

A typical, full-page, newspaper advertisement. The power company pays for one-quarter page; the contractor pays for a half page; the newspaper donates one-quarter page. The use of a large space is thought to have stimulated quick interest and acceptance.

Houston, Texas Has Installed 3,534 Attic Ventilation Systems

By C. A. Loeffler

IN Houston, Texas, "poor man's cooling," technically known as night air cooling or attic ventilation, has made remarkable progress and secured really widespread acceptance. Proof of this statement lies in the fact that at the end of 1938 Houston had 2,968 residential and 566 commercial attic ventilation installations. This excellent result has been obtained since 1935.

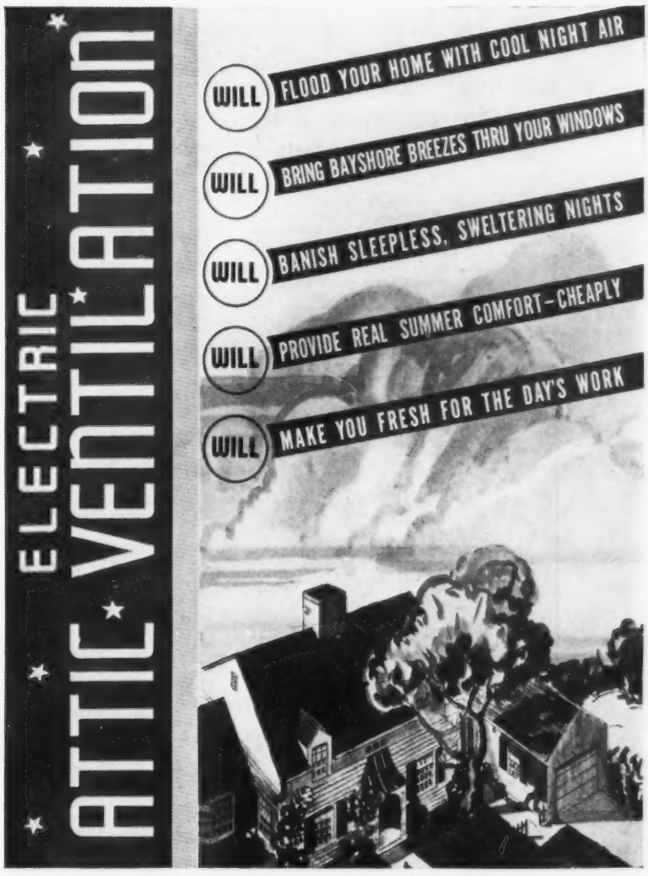
In 1935 the Houston Lighting and Power company became interested in the idea and, upon investigation, decided to launch a concentrated drive for more sales. In 1935, when the attic ventilation campaign first was publicised, there was only one full time agency selling systems with, perhaps, some spasmodic effort by a very few part-time agencies and at the end of the 1935 season untility records showed 46 residential and 7 commercial installations.

To meet the situation the utility, at its own expense, retained two experienced men to work exclusively on attic ventilation sales promotion, the bulk of the time being spent in working with, and giving training to, the retail dealers, whose number was graduatlly increasing.

The year 1936 saw a slow, but steady, development of the field. And, while comparatively small sums were spent in advertising, intensive work was done along the lines of dealer help and dealer promotion. At no time did the Houston Lighting and Power Company endeavor to sell attic ventilation on its own account—such business as its efforts turned up was always allocated among the various dealers in the field.

A potent source of sales leads has been the work of the 40 "Home Service Advisors." Each of these advisors has a fixed district to cover, and, as soon as potential prospects are located, the names and addresses are turned over to the dealer best fitted to handle the business.

In order that the attic ventilation project might get off to a good start, the utility spent practically unlimited time with the retail outlets. Its highly trained employees, free of cost to the retailer, accompanied the dealer when he made his initial sales talk; they accompanied the dealer's technicians when the installation was commenced, and they stood by until the transaction was satisfactorily completed. Further, the services of a trained Sales Councillor was always at the disposal of the dealers.


ELECTRIC
ATTIC VENTILATION
WILL FLOOD YOUR HOME WITH COOL NIGHT AIR
WILL BRING BAYSHORE BREEZES THRU YOUR WINDOWS
WILL BANISH SLEEPLESS, SWELTERING NIGHTS
WILL PROVIDE REAL SUMMER COMFORT—CHEAPLY
WILL MAKE YOU FRESH FOR THE DAY'S WORK

Outside, front cover of a four-page leaflet the power company mailed to a selected list of 5,000 electricity users able to pay for an attic ventilation system.

The year 1937 saw the start of intensive advertising and publicity on the part of the electric utility. A mailing piece was designed and sent out to a selected list of prospects. The prospects were a group chosen from the meter books, and were selected from a section of Houston in which the residents were reasonably likely to be able to readily purchase attic fans.

A total of 5,000 names were chosen in this manner, then re-checked against the city directory to obtain all possible additional data, such as occupation, etc. Promptly upon mailing, copies of the list were handed to each dealer, with the understanding that the follow-up work was distinctly the dealer's responsibility. Actual tabulation of resultant sales was not made, but dealer reaction was most favorable, with reports of a number of sales actually made on the basis of this type of publicity.

County fairs, Fat Stock Shows, furniture shows, and similar types of gatherings were found to be excellent media for acquainting the people with the advantages of attic ventilation. The Houston Lighting and Power Company would purchase a large block of space at each show, and then allocate the space to the various dealers in the district. Thus the only expense to the dealer was that of manning the exhibit.

A. & M. COLLEGE TESTS KELLEY CIRCULATORS

Engineers of Famous Agricultural and Mechanical College of Texas Give Kelley Fans Rigid Efficiency Tests

The coveted "Degree of Efficiency" was placed on the Kelley Gulfbreez Circulators last week by A. and M. College engineers after hours of tedious testing. The rating of A. and M. College adds another "certified rating" to the list of those tests already passed by the Kelley Gulfbreez Circulator. The Kelley product is made by the Tennison Manufacturing Company of Houston. There are three sizes which may be used for both home and business.

Tennison Manufacturing Company, for 50 years one of Houston's largest manufacturers, extended its activities recently into the air-conditioning field. It is the policy of this company, and always has been, to manufacture only high quality products. The amazing acceptance of the Kelley Gulfbreez Circulator proves that the people of Houston and surrounding territory have faith in the products made by the Tennison Company. All of the engineering and manufacturing facilities available to the Tennison Company are included in this fan. Superior features which are not embodied in other circulators may be had in the Kelley unit. The price, however, is moderate and is lower than most high quality circulators used for attic ventilation and for movement of air in places of business.

The superior features of the Kelley Gulfbreez Circulator include such engineering precision as the steel die-cut blades which are dynamically balanced; the spun outlet orifice which increases the efficiency of the fan and keeps operating cost at a minimum; the journal which houses ball-bearing units and shaft packed in grease sufficient for two years' service; Firestone rubber dampeners at all points of contact. The circulator comes equipped with a General Electric Motor and self-tightening belt, which also means low operating costs.

There are other features included in the Kelley Gulfbreez Circulator which make this product a quiet-type fan, designed to give uninterrupted service for many years.

The problem of installing the Kelley Gulfbreez Circulator in the attic is a simple one. Any carpenter can install the circulator in two or three hours' time. All that is necessary is a grille set in the ceiling and a wind tunnel built out of Celotex or wallboard placed at the end of the fan. The hot, oppressive air is sucked up through the ceiling by the fan into the wind tunnel and immediately ejected into the attic and out through louvres built into the walls of the attic. The operation is simple. Full details of installation are included with every Kelley Gulfbreez Circulator.

Anyone considering the purchase of a circulator for home or business use is urged to to call, write or wire the Tennison Manufacturing Company air-conditioning department.

DEALERS!

There are a few choice territories available for distribution of Kelley Gulfbreez Circulators! Phone, write or wire for complete details so that you may be prepared to serve the fast-growing demand for Kelley Gulfbreez Circulators!

THE HOUSE THAT JACK BUILT...

—was intended to be, above all things, a COMFORTABLE House.

It had all the conveniences available for the modest home at the time of its construction . . . still, it's occupants suffered from the heat during the hot summer months . . . moist, sticky afternoons—long restless nights . . . sweltering heat that jaded appetites and ruined dispositions—

Then came the news that a wonderful new method of natural air conditioning was available at low cost . . . real comfort cooling.

It was called Attic Ventilation—a simple, economical, and easily installed ventilating system that would banish forever the nightmare of the hot summer months.

Now the interior of the house that Jack built is located in the comfort zone. It's occupants work and play in a delightfully cool atmosphere . . . sleep comes quickly . . . appetites are keen . . . and dispositions sunny.

The House that Jack Built was intended to be, above all things, a COMFORTABLE House . . .

Electricity is Cheap!

HOUSTON LIGHTING & POWER COMPANY

QUALITY

--- THAT'S THE ONLY REASON WHY THE

Kelley GULFBREEZ CIRCULATOR

HAS RECEIVED UNPRECEDENTED ACCEPTANCE IN THE GULF COAST AREA!

★

A. AND M. COLLEGE PRESENTS KELLEY GULFBREEZ CIRCULATOR WITH ITS "DEGREE OF EFFICIENCY"

The Tennison Manufacturing Company is proud that the Kelley Gulfbreez Circulator has been so widely and enthusiastically received in the Gulf Coast area. This unprecedented acceptance means only one thing—that Tennison has developed a quality fan with highest possible efficiency at a low price. Engineers of the Agricultural and Mechanical College of Texas know a good fan when they TEST it! In a recent test conducted by this College, the Kelley Gulfbreez Circulator received its "Degree of Efficiency" (Certified Rating).

All of this means that the Tennison Manufacturing Company has developed a product which is SECOND TO NONE! Backed by 50 years of manufacturing and engineering experience, Tennison UNCONDITIONALLY GUARANTEES the Kelley Gulfbreez Circulator to give satisfactory service.

BEFORE YOU BUY A CIRCULATOR FOR HOME OR BUSINESS, BE SURE IT HAS THESE OUTSTANDING FEATURES . . . .

BLADES which are designed to eject air quietly and efficiently. Blades used on a Kelley Gulfbreez Circulator are curved. Made of STEEL and die-stamped. Blades are all dynamically balanced.

HOUSING made of auto-steel. Ruggedly constructed in Tennison's own plant. A spun outlet orifice on housing increases efficiency of fan. Finished in green, needle-point lacquer.

MOTOR is a General Electric, the most famous motor in the world. Built to do the job RIGHT! This G.E. Motor is mounted in rubber, which means no radio interference. Makes it quiet.

CAPACITY means everything in selecting a circulator for home or business. The Kelley Gulfbreez Circulator moves more air per minute than ordinary "attic ventilators."

BRACES are of steel tubing. These braces are mounted on Firestone rubber "dampeners" at all points of contact. Ruggedly constructed to make a durable, lifetime circulator without noise or vibration.

CERTIFIED RATINGS of Kelley-Gulfbreez Circulators mean that these fans are accepted by engineers as being of high efficiency, sturdy in construction and capable of moving their rated capacity of air per minute.

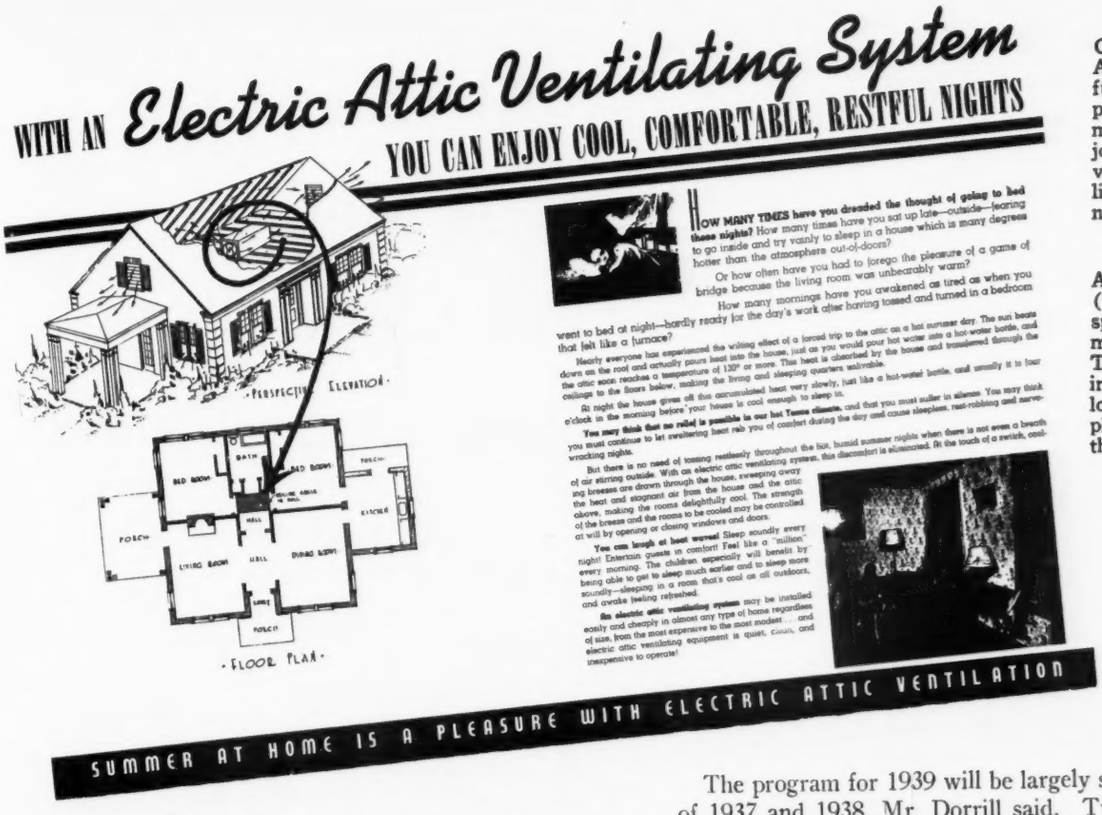
Its High Efficiency Means Lower Electric Power Consumption!

TENNISON MANUFACTURING COMPANY
HOUSTON, TEXAS

FREE! VENTILATING SURVEY OF YOUR HOME OR PLACE OF BUSINESS. CALL YOUR DEALER OR TENNISON MANUFACTURING CO.

In addition to the above, the Houston Lighting and Power Company stages a big electric show once a year in each of its eight divisions. A suitable building is hired, entertainment units are provided, and all supervisors move in to provide all sales publicity possible—all at the expense of the electric utility. A complete line of electric products are displayed, including attic ventilation, and worth-while door prizes are awarded each night. The last night usually sees the awarding of a valuable grand prize, such as a two hundred dollar refrigerator. The cost of this last item is split between the Houston Lighting and Power Company and the participating dealers.

Since the Houston District is a compact, well-settled


WITH AN Electric Attic Ventilating System
YOU CAN ENJOY COOL, COMFORTABLE, RESTFUL NIGHTS
How many times have you dreaded the thought of going to bed these nights? How many times have you sat up late—outside—fearing to go inside and try vainly to sleep in a house which is many degrees hotter than the atmosphere out-of-doors?
Or how often have you had to forego the pleasure of a game of bridge because the living room was unbearably warm?
How many mornings have you awakened as tired as when you went to bed at night—hardly ready for the day's work after having tossed and turned in a bedroom that felt like a furnace?
Nearly everyone has experienced the wilting effect of a forced trip to the attic on a hot summer day. The sun beats down on the roof and actually pours heat into the house, just as you would pour hot water into a hot-water bottle, and the attic soon reaches a temperature of 130° or more. This heat is absorbed by the house and transferred through the ceilings to the floors below, making the living and sleeping quarters unlivable.
At night the house gives off this accumulated heat very slowly, just like a hot-water bottle, and usually it is four o'clock in the morning before your house is cool enough to sleep in.
You may think that no relief is possible in our hot Texas climate, and that you must suffer in silence. You may think you must continue to let sweltering heat rob you of comfort during the day and cause sleepless, rest-robbing and nerve-wracking nights.
But there is no need of tossing restlessly throughout the hot, humid summer nights when there is not even a breath of air stirring outside. With an electric attic ventilating system, this discomfort is eliminated. At the touch of a switch, cool-ing breezes are drawn through the house, sweeping away the heat and stagnant air from the house and the attic above, making the rooms delightfully cool. The strength of the breeze and the rooms to be cooled may be controlled at will by opening or closing windows and doors.
You can laugh at heat waves! Sleep soundly every night! Entertain guests in comfort! Feel like a "million" every morning. The children especially will benefit by being able to get to sleep much earlier and to sleep more soundly—sleeping in a room that's cool as all outdoors, and awake feeling refreshed.
An electric attic ventilating system may be installed easily and cheaply in almost any type of home regardless of size, from the most expensive to the most modest . . . and electric attic ventilating equipment is quiet, clean, and inexpensive to operate!
PERSPECTIVE ELEVATION
FLOOR PLAN
SUMMER AT HOME IS A PLEASURE WITH ELECTRIC ATTIC VENTILATION

On facing page—Another typical full page newspaper advertisement paid for jointly. In this advertisement a publicity item is donated by the newspaper.

At left—Center (two page) spread from the mailing leaflet. The leaflet was intended to follow up the explanatory call of the Home Service Advisor.

prosperous series of large and small communities, serving 115,000 residential customers, it can readily be seen that these shows provide excellent sales publicity.

The sales policy of 1938 was very similar to that of 1937. The circularization project described in the 1937 section was continued in 1938, a different section of the city being circularized each time.

Also, 1938, saw the beginning of a cooperative advertising project. This is handled in various ways. One popular method is for the dealer to contract to take a half page ad in a local newspaper; the Houston Lighting and Power Company agrees to take a quarter page on the same sheet, and the newspaper thereupon devotes the remaining one-quarter page to free publicity news items relative to the value of attic ventilation. In this way the value of a full page ad is obtained by the dealer thru the purchase of a half page of space.

Another method, (as illustrated) is that of the dealer buying one half of a page, and the Houston Lighting and Power Company buying one-quarter page and the newspaper donating one-quarter page.

The capable spade-work done by the electric utility during the earlier years of the campaign was so efficient that one phase of the service has been practically discontinued. Houston retail dealers are now so skilled in the technical phases of the work that it is no longer necessary for the utility's men to make further dealer-promotion calls.

The outlook for 1939 is extremely favorable, according to H. E. Dorrill, Sales Promotion Supervisor for the Houston Lighting and Power Company. "We have set a quota of 2,000 attic ventilation fans for 1939 residential installation," said Mr. Dorrill. "And the present indications are that we will exceed this quota by about 50%." No quota has been set on commercial installations.

The program for 1939 will be largely similar to those of 1937 and 1938, Mr. Dorrill said. Two home planning counsellors now work out of the sales promotional department, and call on architects, speculative builders and prospective home builders and discuss electric services. Most of the people, they find, react favorably toward attic ventilation.

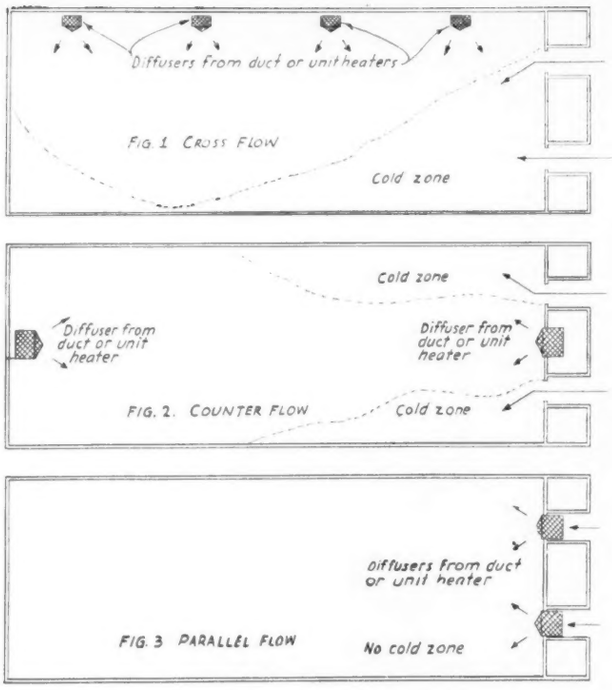
By subscribing to Dodge reports, and by other means, the electric utility endeavors to reach the builder while the home is yet in the formative stage, and not wait until the completion of the house, with increased difficulties of installation.

Also, each Home Service Advisor is responsible for the initial call upon each new home-building prospect in her district. By keeping in intimate touch with the clients under her supervision, she frequently learns of home-building plans long before contractors and architects are called in, and thus many valuable leads are obtained.

The popularity of attic ventilation in the Houston district is amply reflected in the sales figures as reflected by the electric utility records. In 1935, there were 46 residential and 7 commercial installations. The year 1936 saw 227 residential and 14 commercial installations. Another marked increase was witnessed in 1937, with 723 residential and 166 commercial installations, while 1938 showed the very impressive increase of 1,972 residential and 263 commercial installations.

The total installations in the Houston district are, therefore, 2,968 residential and 566 commercial, making a total residential and commercial installations of 3,534. The total horse-power developed is 1,285; 283 horse-power for the commercial installations and 1,002 horse-power for the residential installations. The average value of each installation is about $225, and the retail price lists range from $60 for a 24-inch fan to

(*Continued on Page* 108)


Diffusers from duct or unit heaters
FIG. 1 CROSS FLOW
Cold zone
Cold zone
Diffuser from duct or unit heater
Diffuser from duct or unit heater
FIG. 2. COUNTER FLOW
Cold zone
Diffusers from duct or unit heater
FIG. 3 PARALLEL FLOW
No cold zone

Air distribution results and cold areas commonly found with popular types of warm air introducing systems and (Fig. 3) an "air curtain" installation with no cold zones.

◆

"Air Curtains," A Method For Controlling Open Door Drafts

By H. F. Purcell
Engineer, W. H. Harris Tinsmiths, Ltd., Christchurch, New Zealand

FOR many years heating engineers have been battling with the problem of heating shops and stores where, for business purposes, it has been found necessary to keep the front shop doors open all day. An example might be shops of the "five and ten" type which depend upon casual shoppers.

The writer cannot claim origination of the idea propounded in this article, but he does claim adaptation of a proven idea. In this case the adaptation arose through reading an article on the construction of the Cunarder "Queen Mary." In this article it was stated that in order to protect bridge officers from the air-stream caused by the high speed of the ship, air slots were formed running across the ship just in front of the bridge-rail. These slots were larger at the bottom than at the top with the result that air-pressure formed by the forward motion of the deck-house deflected the air current upwards until it entered the wide opening of the bridge-rail slots. The narrowing of the slots at the topside of the rail naturally increased the velocity of the vertical air-stream to a speed where it exceeded the speed of the air-current towards the ship. The graph accompanying the article showed that the vertical air-stream diverted the horizontal air-stream to a point well above the heads of the bridge officers, where it merged with the horizontal air-stream.

This article indicated that a high velocity air-stream, flowing in a given direction, would form an invisible curtain which would not be easily penetrated by an air-stream with a lower velocity.

Having carefully read the Queen Mary article it gradually dawned on me that this was the logical solution of the open door heating problem and experiments were put in hand to demonstrate the truth or otherwise of the theory.

Air More Important than Ducts

The first step was to study existing installations to find out the actual results obtained by such installations and whether an installation based on the Air Curtain theory would obviate cold zones in an open door store.

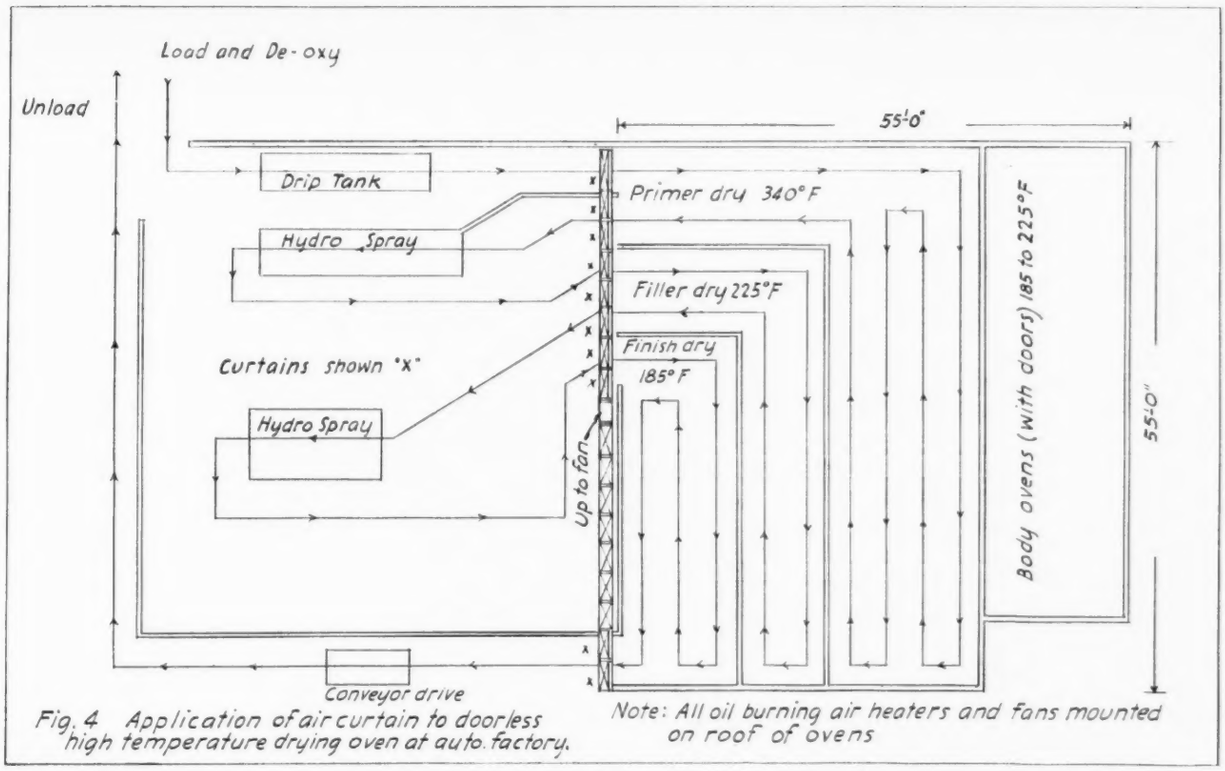
Previous experience had already demonstrated that for a single enclosure, heating by air, it was not necessary to have a comprehensive duct system but equal. if not better results, could be obtained by a few registers rather than a concealed duct system (which would entail a certain amount of heat loss) with registers at intervals around a fair sized enclosure, say up to 150 x 50 feet provided that the required volume of air, carrying the proper quantity of Btu's were supplied at the logical point or points.

Effect of Multiple Registers

A study of Figs. 1, 2 and 3 will demonstrate the results obtained by different positions of the air outlets. The source of the warm air supply can be either unit heaters or duct registers so long as the factors of volume, velocity and heat are present in correct proportion.

Fig. 1 shows a line of unit heaters (or registers) on one side of a store with a cold zone extending along the opposite wall to the very back of the store. If the registers are alternated on both sides of the store, the cold zone will extend along a line down the center of the store until the back pressure from the end wall equalizes the pressure of the air entering through the front door. The spaces behind the counters along the side walls will be overheated which accentuates the feeling of underheating along the center line.

Fig. 2 shows a large heat outlet placed at each end of the store, and in this case cold zones extend along



Above—A factory baking oven with air curtains keeping oven temperatures up and room temperatures down. Below—Elevation of same installation showing air movement from the "curtain."

the sides until the pressure is equalized as above.

In both cases should the back door be opened for the reception of goods, for instance, the cold zones extend clear to the back wall and most of the heat generated is lost.

Now in the case of Fig. 3 an outlet of the same capacity as those in Fig. 2 are placed over the doorways and fitted with chevron diffusers (Fig. 6). These diffusers form an air curtain in front of each door with the result that any air entering the store must penetrate the warm air curtain and any air from the outside which does penetrate the curtain must mix with the warm air and have its temperature raised. In this case instead of trying to "buck" a natural force we use that natural force to assist in attaining our object, that is to evenly warm the store. A description of the chevron diffuser will be given at the end of this article.

I have used this method of heating such premises in scores of installations and up to the present not one has failed to give the desired results.

At this time last year I was given a $20,000 contract to build insulated, high-temperature paint-drying ovens at the assembly plant of one of the best known automobile firms of America. The furnaces and fans were supplied by the owners and I was responsible for the design and fabrication of the ovens and duct system to a given requirement.

The ovens were fabricated out of 22-gauge black steel, interlocking envelopes 3 inches thick, each panel being approximately 5 x 2 foot finished. The spaces within the envelopes were filled with glass wool. The envelopes were mounted around and on a framework

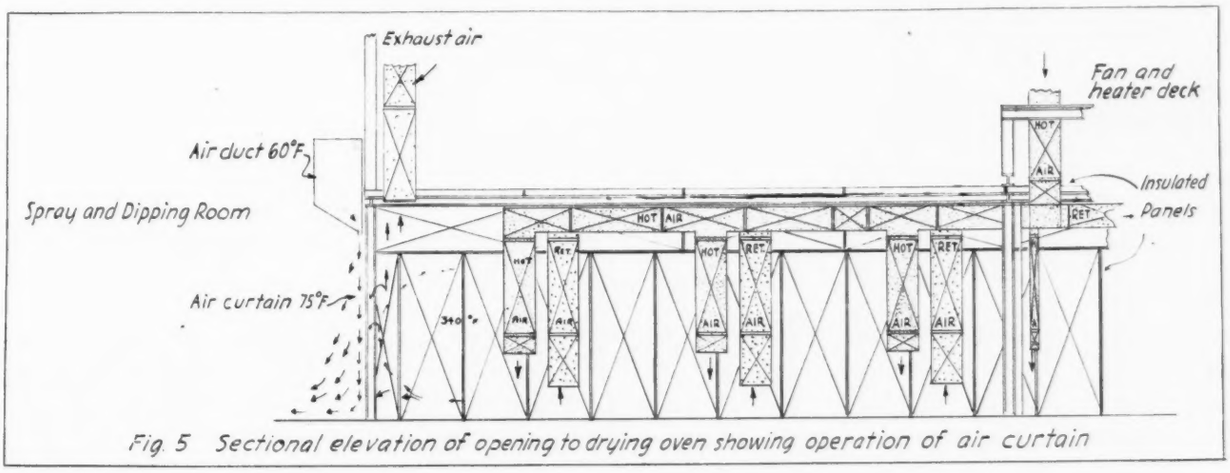


Fig. 5 Sectional elevation of opening to drying oven showing operation of air curtain

of rolled steel joists, it being specified that the ovens should be strong enough to carry a chequer plate deck on which would be mounted some 14 tons of furnace and fan equipment. The duct system was a very complicated one and consisted of warm air droppers and return droppers placed on 6 foot centers in each direction. Near the openings, exhaust ducts were placed to dilute what might become an explosive mixture. Make-up air was drawn through a filter box into which the return air ducts led. Thus the proportion of return air and makeup air could be adjusted at will.

Since the larger portion of the oven was devoted to a conveyor system, it was obvious that doors could not be fitted to this portion which was divided into three compartments with design-temperatures of 340, 225 and 185-deg. F. respectively (see Fig. 4).

Apart from the probable heat loss through the openings which admitted the conveyor chain and the wings and other spare parts being dried, a man had to stand by the dip tank to dip the parts into a tank of primer which was within 20 feet of the opening to the 340-deg. oven. A further complication was the 75,000 cfm. fans drawing air through the hydro spray booths which were placed in the same room into which most of the oven-openings led. A make-up fan was installed, but even with this running the 340-deg. oven failed to reach that temperature whilst the point where the dipper would have to stand had temperatures up to 140-deg.

An air curtain was suggested to cure the trouble and after other attempts were made to raise the oven from 280-deg. to the required 340-deg., a fan was installed above the opening with the airstream directed straight down in front of the opening. The temperature in the oven immediately jumped up to the desired temperature whilst the room temperature right up to the curtain never exceeded 75-deg. Later a duct system was installed and recently the owners reported that the whole system was functioning splendidly and they were considering enlarging the oven to take care of increased business. Fig. 5 shows a small section of the oven showing how the air curtain is formed for this purpose.

Similar curtains have been installed between proving rooms of bakeries where different temperatures have to be maintained in adjoining rooms during the processing of bread.

Fig. 6 shows details of our latest type of diffuser which has chevron shaped diffuser blades. Previously we used to install diffusers with both horizontal and vertical blades and whilst they worked perfectly, they were certainly rather clumsy in appearance. After some experimentation we developed the chevron shaped blade. This when set at a 30-deg. angle as shown, delivers the air in a fan formation which gives an excellent air curtain. Details of the blade itself are given below the front elevation in Fig. 6 for the benefit of any readers who might like to try out the idea.

To arrive at the correct dimensions of the air curtain diffuser use the following formula:

1—Find the correct heating load required.

2—Find the volume of air required to give a register temperature of 150-deg. F.

3—Divide the volume by the number of doors over which the units or duct-diffusers have to go to give an outlet velocity of not less than 1,000 fpm.

This outlet velocity will take care of any wind velocity up to 10 mph. Store owners have found this method a business-getter as the heat being so close to the doorways induces potential customers to enter the store to get away from the outdoor cold.

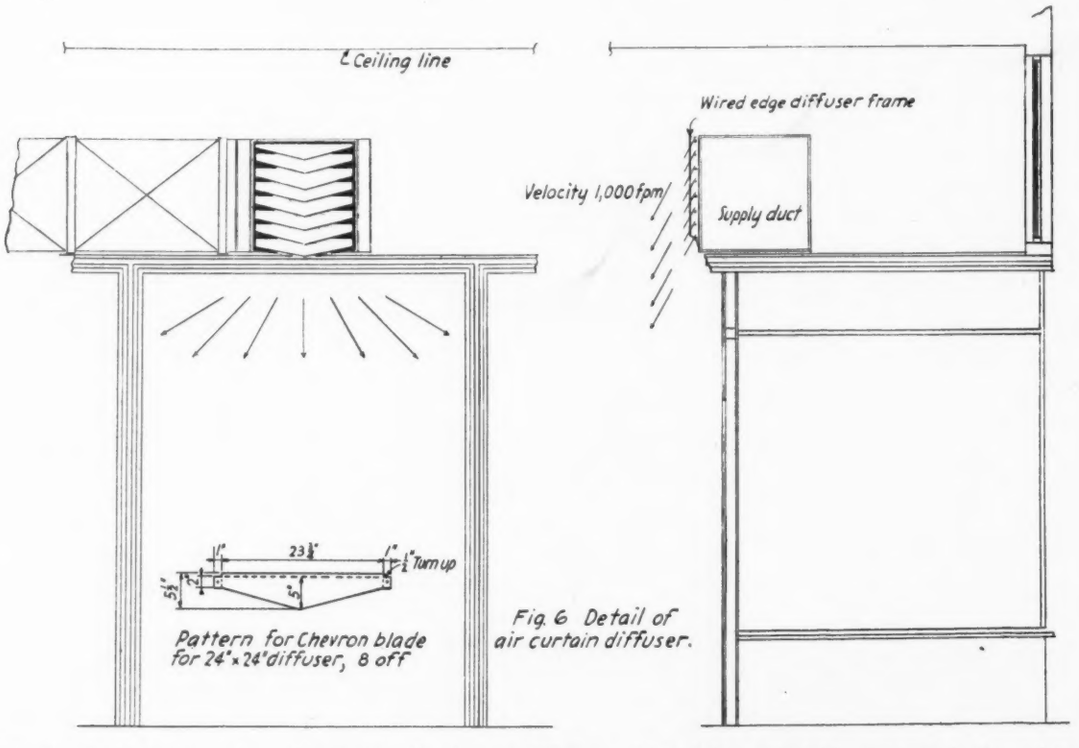
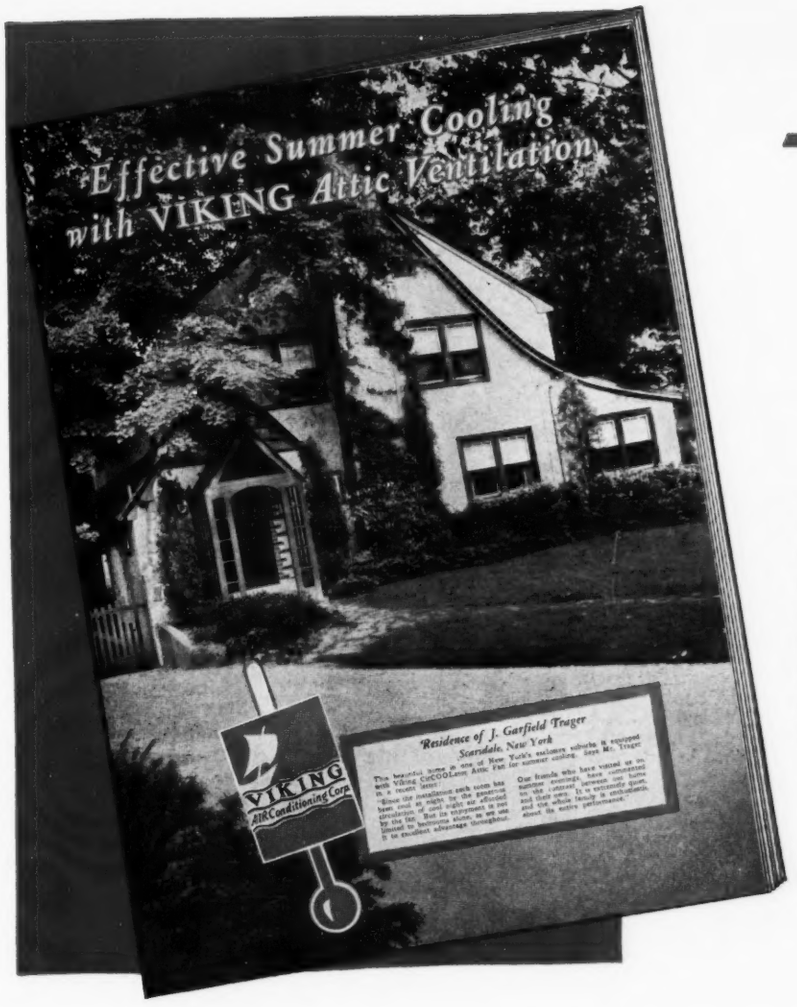


Fig. 6 Detail of air curtain diffuser.

Details of unit heaters of register faces with chevron diffusers which, being adjustable, control air flow of the "curtain."



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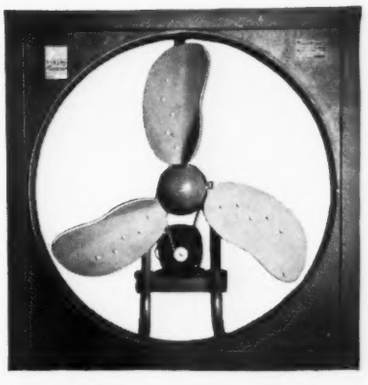

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New York State Convention Lays Emphasis on Practical Problems

UNUSUAL emphasis on practical suggestions for saving time and doing better heating, sheet metal and roofing work, featured the 16th annual convention of the New York State Sheet Metal, Roofing and Air Conditioning Contractors' Association, in Albany, March 2, 3 and 4.

Opportunities in Sheet Metal

In that part of the program dealing with roofing and sheet metal work, Paul B. Andrews, Revere Copper and Brass Incorporated, speaking on "Sheet Metal Opportunities" pointed out that all indications point to an anticipated 30 percent increase in building construction for 1939 over 1938 and asked contractors to stop looking for excuses for bad business and to remember that booms or depressions are only collective individual performances. Being such, depressions are brought about when a sufficient number of people stop buying, start complaining, become fearful; and booms result when a sufficient number of people begin actively to look forward, inaugurate new ways of doing old things, and determine aggressively to build each individual business.

Admitting that the forthcoming activity in building construction may not in itself create a boom in sheet metal and roofing construction, since our industry is only one of many, all seeking their share of the consumers' dollar, whether our industry has a boom or a depression will depend upon what each contractor does individually and all associations do collectively to build business for our own industry. Mr. Andrews pointed out that between the civil war and the world war, architecture in general was ornamented by elaborate sheet metal work; all of this disappeared after the world war, because of a change in architectural preference. And further admitting that metal ornamentation may never come again since architects are now governed by economy caused by high cost of space and taxes, Mr. Andrews asked contractors to consider the item of flashing, which is becoming increasingly important as thicknesses of walls are decreased, as changes in building laws require frequent parapets.

Thru-wall flashing, parapet flashing, copper cap and base flashing where walls meet roofs, all applied according to standard practices which the industry has established, are the answer to this problem and a profitable field for the industry. Mr. Andrews explained at some length just where thru-wall flashing should be applied as, for example, over the tops of stone cornices, through walls which rise above the roof line at the point of the roof line, over the heads of all window and door openings, under all window and door sills, around all spandrel beams, at all belt courses, water tables, etc.

As evidence that there still remains a considerable amount of sheet metal on modern buildings, Mr. Andrews pointed out that metal ridges, cornices, leaders and gutters, ventilators, and air conditioning still add up to a sizeable amount of metal work.

Built-up (Pitch) Roofs

Elmer R. Hyde, of the Technical Department, Koppers Company, speaking on "Coal Tar Pitch Steep Roofs," prefaced his remarks on roofing application by pointing out that there seems to be a growing tendency to use flat roofs for summer cooling purposes by making the roof into a water pond with water one-half to two inches deep and permitting this water layer to absorb a large share of the radiant sun heat. Supplemented by night air ventilation, this practical method of cooling has solved the problem for a growing number of owners.

The speaker related some results of recent investigations where coal tar pitch on roofs with a pitch six inches to the foot, has been found to stand up without flow or runs or cracks by the use of a special pitch. So successful have been the results that these special roofs are bonded up to 20 years. All of these roofs are slag covered with from 250 to 270 pounds of slag per square. Also felt must run across the roof and not up and down to reduce the drag of the pitch on the felt; the pitch must not be applied too thinly and it is better to apply the pitch from a dipper than by mopping.

"Roll Out" Pattern Method

Ralph W. Poe, sponsored by American Rolling Mill Company, presented his "Short Method of Pattern Development," using the roll-out method. Since this address has been presented in several previous state convention reports, it is necessary only to add that Mr. Poe showed a large number of practical items which can be laid out by the roll-out pattern method.

Mr. Poe announced that a series of articles covering the method and showing step by step operations have started in American Rolling Mill's magazine "Ingot-Iron Shop News," and any contractor who does not regularly receive this paper may obtain copies by addressing the American Rolling Mill Company, Middletown, Ohio.

Price Per Opening

The heating session of the convention covered engineering, pricing, selection of registers and was opened by J. D. Wilder, Editor, AMERICAN ARTISAN, speaking on "Price-Per-Opening." Admitting that there has been much controversy over "Price-Per-Opening" and

explaining that price-per-opening has unjustly been accused of establishing prices which are too low and that there is much misunderstanding over just what price-per-opening includes, the speaker pointed out that price-per-opening became established because of builder's, architect's, and owner's desire for an immediate quotation on installation and upon the heating contractors' desire to give the owner or buyer an approximate idea of what the system will cost without having to devote a large amount of time to preparing detailed plans and quotations when there is some doubt that the contract will be secured. Attention was called to the survey of "Price-Per-Opening" published in the January, 1939, issue of AMERICAN ARTISAN, with particular reference to the similarity in operations and materials included in the price-per-opening bids of contractors all over the country.

That there is good reason for using price-per-opening as a method of bidding was demonstrated by figures secured from a Mid-West contractor who has recorded his actual costs over a period of time and a large variety of jobs. Five typical installations were placed upon the blackboard with the figures as follows:

Type of House	Size of Job Openings	No. of W. A. Openings	No. of C. A. Openings	Type of Duct Work	Total Lbs. of Iron Used	Lbs. of Iron Per Opening	Labor-Hours Per Opening
1—New[1]	32	18	14	Rect. Main, Round Branches.	1800	56	6¼
2—New[2]	16	9	7	Rect. Main, Round Branches.	900	56	5
3—New[3]	14	8	6	All Rect.	854	61	7½
4—Old[4]	8	5	3	All Round	453	56	7¼
5—Old[5]	19	14	5	Indiv. Round ..	588	31	6

Notes.

1. A 4-level house with heat to all levels.
2. 4 W. A. to second floor; all returns from first floor.
3. Two story house.
4. No previous furnace; Bungalow; no stacks.
5. 3 new stacks to second floor; used some 6 in. downspouting for ducts.

The interesting feature of these figures seemed to be the similarity in the amount of material required for a wide variety of installations, both old house and new, both large house and small, therefore, when such figures are used intelligently and the limitations of price-per-opening are thoroughly understood by the contractor, there should be little reason for the contractor to avoid price-per-opening as a method of bidding so long as he does not try to apply his figures to unusually large or complicated systems. A conclusion is that when price-per-opening is based upon the contractor's actual cost figures and not upon prices-per-opening quoted by competitive contractors; when the figures are based upon a wide variety of installations; when there is nothing unusual about the installation; when the mechanics employed are "good" or "better"; there should be no reason why price-per-opening is not a satisfactory method of submitting a bid when the possibility of securing a contract or the buyers wishes are such that a detailed engineering design and estimate sheet is not warranted.

Register Standardization

"Air Conditioning Registers" was the subject of a paper which described development of air conditioning registers from the simple plate with drilled holes to today's diversified types of registers which control practically any desired air flow. Mr. Stag, reading the paper prepared by C. J. Pearson, United States Register Company, called attention to the possibilities of saving where a register six inches deep with the face varying 8, 10, 12 or 14 inches in width will reduce the stock of registers required. Mr. Pearson pointed out that a committee is now working to reduce the number of sizes and standardize dimensions of registers and that an interesting recent development is the type of register which has an insert behind the face to control the flow and direction of air movement. Registers placed too close to the wall or ceiling, or with air flow directed to wall or ceiling resulting in dirty streaks are one problem which the industry must solve and, whereas much attention has been paid to leaky register faces, the streaking problem is much more acute.

N. W. A. H. & A. C. Accomplishments

President L. R. Taylor of the National Warm Air Heating & Air Conditioning Association said he regretted that there are today too many organizations riding on the coat tails of association members and association research work without contributing their fair share to the cost of this research activity. As an indication of accomplishment, President Taylor said that 25 years ago manufacturers and contractors had no definite heating data; furnaces were rated according to competition; poor and inadequate systems were so wide-spread that home owners apologized for having a warm air furnace; there was no national association to carry on much needed research work—whereas, today, the association has completed 20 years of research work and the industry now has available conclusive facts on practically every problem relating to heating or residential air conditioning. During this time association research has looked into gravity furnace operation, has settled the problem of outside versus inside air, has definitely established the carrying capacity of leaders and branches, has set up rules covering the

rating of all types of furnaces, has investigated oil burners, stokers and cooling in all their phases, and while this program of research is perhaps the most inclusive program ever conducted by a trade association, much remains to be done and efforts are now being promulgated to bring within the association all those manufacturers directly and indirectly connected with the warm air heating industry as well as jobbers and contractors.

Short Cut Engineering

G. A. Voorhees, the Furblo Company, presented "A Simplified Method of Figuring Mechanical Warm Air Heating" which was introduced originally because contractors desired a quick method of engineering a system which was not unduly complicated and which would be more accurate than rule-of-thumb methods such as a 9 x 12 register for a 9 x 12 rug. Mr. Voorhees also pointed out that because engineering is so fascinating, many contractors tend to spend too much time on engineering and too little time to selling and management.

The speaker pointed out that when practical engineering is contemplated it is quickly established that rooms are pretty much alike, house construction is pretty much alike in any given community, systems tend to be more or less standardized according to the experience of the installer, and most contractors tend to standardize their engineering design upon certain register air temperatures or pipe velocities or register sizes, or types of duct construction. All these things being true, then for the average job it should be possible to set up a practical time-saving engineering method. Mr. Voorhees handed out sheets of prepared tables showing the relationship between air changes, room cubic contents, and register air temperature, heat losses of rooms with one, two, or three sides exposed with from one to eight windows, with cold floors or tight floors above, where room sizes range from 7 x 7 to 16 x 32 feet; and pipe size charts of risers, branches and trunks with sizes of register for different cfms and different room heat losses.

These tables are identical with the tables published in Mr. Voorhees' series appearing in "American Artisan" under the title "Precalculated Engineering."

Records, The Basis of Estimating

General aspects of business included cost accounting, unemployment insurance, group compensation, and building contracts and the sub-contractor. Edwin A. Scott, Editor, Sheet Metal Worker, speaking on "What Have You Done" declared that one of the most important problems confronting contractors today is the problem of better estimating and accurate costkeeping. Every good contractor, said Mr. Scott, should check his final cost records of each job against his estimated cost record to see how good an estimator he actually is and while no one is willing to take a contract below cost, we all do this occasionally, but if accurate and comprehensive records are maintained, it is easy to check back from final figures to estimates and see wherein losses occurred. Materials ordinarily are easy to take off, but labor is always an uncertain item and usually accounts for the spread in bids offered, so by keeping a record of estimates and actual cost this labor item can be more closely controlled.

The second big variation in bids is usually found in the amount charged to overhead as shown by the records of Philadelphia shops, presented from time to time in pages of Sheet Metal Worker and American Artisan. In the records from the Philadelphia shops, owner's time not charged against any one job, lost shop time, office help, automobile and truck operating expense, sales adjustments, rent, account for 85.7 percent of all overhead costs. The speaker showed these cost relationships with two typical jobs itemizing each item of cost individually.

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Contracts and Bookstore Forms

J. G. Link, speaking on "Building Contracts" at the luncheon for architects said New York State will probably borrow $300,000,000 for low-cost housing—$200,000,000 to be spent in greater New York, and $100,000,000 up-state. The New York State Association of Builders wants all of these jobs designed by local architects and built by competitive contractors rather than by forced work. The Association is also campaigning for combination bids which can be entered by two or more general contractors to offset the present lack of sufficient capital to take large contracts by an individual contractor. The association is definitely campaigning against the gross receipts tax (.2 of one per cent) because the history of tax laws shows that once installed it is extremely difficult to take the tax off the statute books and the tax is usually increased year by year until it assumes alarming proportions. Under this gross receipts tax in New York State, the general contractor must pay the tax; where part of the work is subcontracted the sub-contractors again pay their part of the tax, the material men pay, the sub-sub-contractors pay and so on until the tax actually amounts to several per cent. Mr. Link declared that contractors using standardized forms purchased from office supply houses should be sure to see that the form used actually applies to the contract under consideration and should state definitely when the contractor is to be paid and how. Secondly, every sub-contractor should be covered by all types of necessary insurance.

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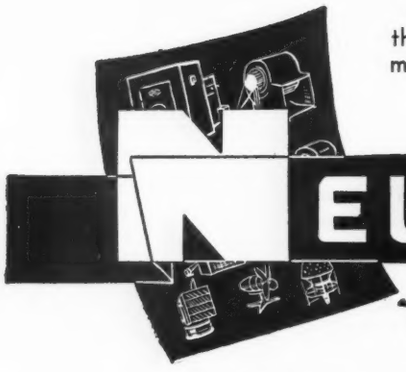

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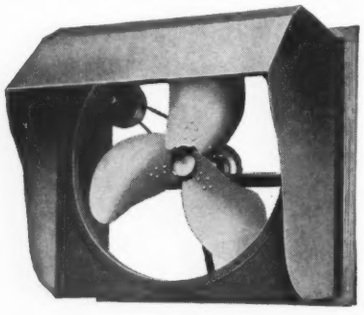
39—Apartment Cooling Fan

Chelsea Fan & Blower Co., Inc., 370 West 15th St., New York City, announces a new apartment model cooling fan to be installed on the outer part of a window. The makers say this fan has a distinct place in the attic cooling field. In homes so constructed



that it is impossible to install an attic fan, some cooling can be obtained.

The Chelsea apartment model fan is manufactured in two sizes—24 and 30 in. The fan rotates at very slow speed with specially constructed blade to deliver a large volume of air without any noise. A metal awning thoroughly protects the motor from outside conditions. The fan is finished in durable weatherproof paint.

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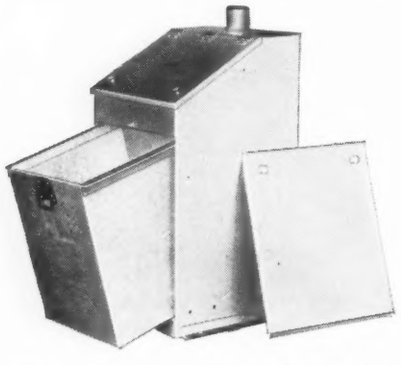
●40—Klinker Kan

American Machine Products Co., Marshalltown, Iowa, announces the Am-Pe-Co Klinker Kan—a container



for the disposal of stoker clinkers with their gas, smell and smoke.

The cabinet is made with the same locked joints used in the manufacture of the Am-Pe-Co furnace blowers since 1929. The service door makes an air tight enclosure when in place. The inner cabinet, as well as the outer cabinet, is made of 20-gauge galvanized metal. The bottom of the can sets 1½ inches off the floor.

When the cover is opened, the draft is greatly increased through the three-inch vent connection to the chimney. When the cover is closed, ventilation continues by admittance of air through the holes at the bottom of the cabinet.

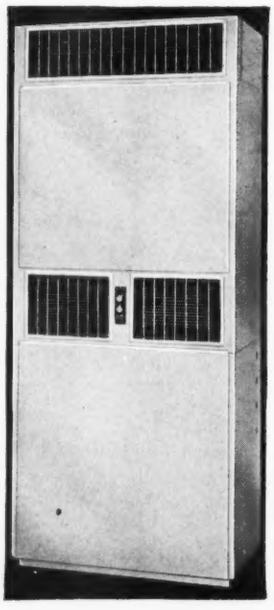
This Klinker Kan can be used as an ash container for the ordinary furnace, also as a means of disposing of garbage—in winter as an incinerator; in summer a garbage can.

◆

●41—Unit Store Cooler

Scott-Newcomb, Inc., 1922 Pine Street, St. Louis, is now offering a unit store cooler in sizes of 3- and 5-ton. They are also offering a ½-ton and ¾-ton room cooler unit.

On the store cooler, the grilles are adjustable and auxilliary outlets are

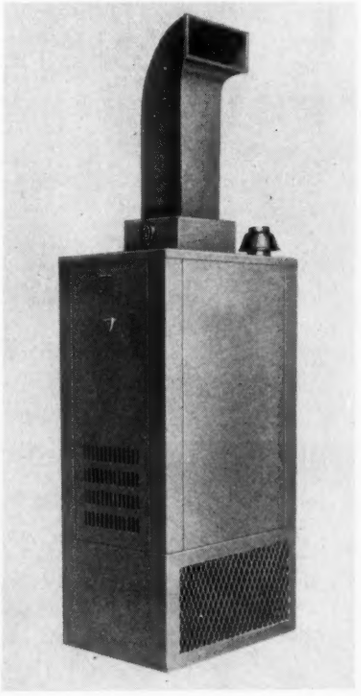


provided on either side of the machine. A quiet, slow speed blower is used. Provision is made for a heating coil, in addition to the cooling and dehumidifying coil. An automatic motor starter and control is provided. The compressor motor has built-in overload, with automatic belt tightener. Power units are rubber and spring mounted, and the cabinet is completely insulated and sound proof.

42—AGP Unit Heater

American Gas Products, Division of American Radiator Company, 40 West 40th Street, New York City, has recently added a floor-type unit heater to its line of gas-fired heating equipment. This heater is modern in appearance, sturdy, and a completely self-contained heating unit which may be installed directly in the space to be heated.

Air is drawn through the intake grille at the side of the casing at the floor level, is heated as the fan in the



base blows it over the heat exchanger, and is discharged through a diffusing cowl, well above head level. The fan is of the double inlet, Sirocco AC type, with die formed, stream-lined inlets for high efficiency and quiet operation. The cowl is scientifically proportioned with iso-formed air flow, high discharge velocity and minimum resistance. The cowl is square, permitting discharge connection on either side, front, or back.

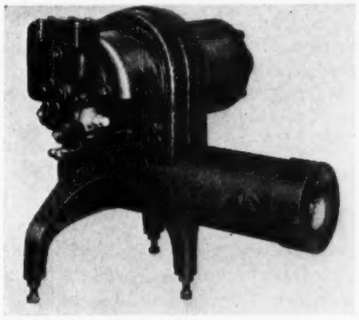
This heater is made in four sizes, with hourly inputs from 56,000 to 150,000 Btu. It is reasonably priced and offers an ideal appliance for heating stores, shops, factories, houses, meeting and dance halls, and many other commercial and industrial establishments.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 99.

43—Fluid Heat Pressure Burner

Fluid Heat Division of Anchor Post Fence Co., Eastern Ave. and Kane St., Baltimore, announces a new pressure burner that performs with a practically flat curve of high combustion efficiency from 7/10 to 3 g.p.h. The principle of discharge air regulation, pioneered by



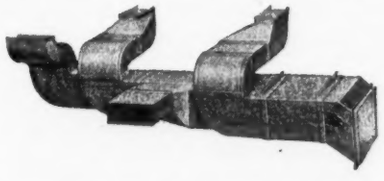
Fluid Heat, has been further developed and is incorporated in the new job which is known as Model P-3C.

Another departure from the ordinary is the use of steel stampings for all burner parts except nose piece and pump bracket. Servicing is a simple matter because the entire internal assembly consisting of air adjustment, spiral, oil line, nozzle and ignitors can be quickly removed.

44—Prefabricated Ducts

Char-Gale Manufacturing Company, 3125 Hiawatha Avenue, Minneapolis, have been manufacturing for over two years a line of standard prefabricated ducts and fittings, for all jobs, either forced air or gravity.

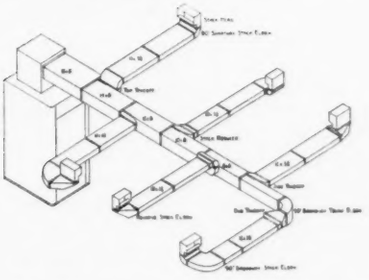
By standardizing on a minimum number of shapes, and sizes in those shapes, the stock required by dealer and jobber is greatly reduced. Only



one trunk line depth of 8 inches is standard, allowing ample head room. The graduated trunk line system advocated provides excellent balance of air distribution. The quality and appearance of the installed job is equal, they say, to the best tailor made job, at greatly reduced shop and labor cost. The manufacturer keeps all shapes and sizes constantly in stock and is prepared to make immediate shipment. Their drafting department offers the dealer a complete plan and estimate service free of all charge. Catalog will be sent on request.

•45—Prefabricated Ducts and Fittings

The L. J. Mueller Furnace Company, 2005 W. Oklahoma Avenue, Milwaukee, offers a complete line of Prefabricated Duct and Fittings for forced-air and air conditioning installations. The line includes three systems of fittings—the Mueller Stack Branch System, the Mueller Duct Branch System, the Mueller Round Branch System. Each has its distinct installation advantage.



Mueller systems have definite capacity ratings. The frictional equivalent of each fitting with standard roughing-in dimensions is given in the regular catalog literature.

Many new features have been embodied in these systems to reduce the man-hours of installation time, reduce the number of items, increase the flexibility of standard items to meet all building conditions, and to reduce the over-all cost of duct work.

A new method of making takeoffs from a trunk line has been developed by Mueller (patent pending). Systems may be designed according to the most recent specifications of the National Warm Air Heating and Air Conditioning Association and can be simply laid out, simply estimated, and simply installed, they say.

•46—Attic Fans Time Switch

Minneapolis - Honeywell Regulator Company, Minneapolis, Minnesota, announces Type S403A Timer for application in the many instances where a simple time switching operation is required. It has been designed primarily to control the operation of electrical equipment.

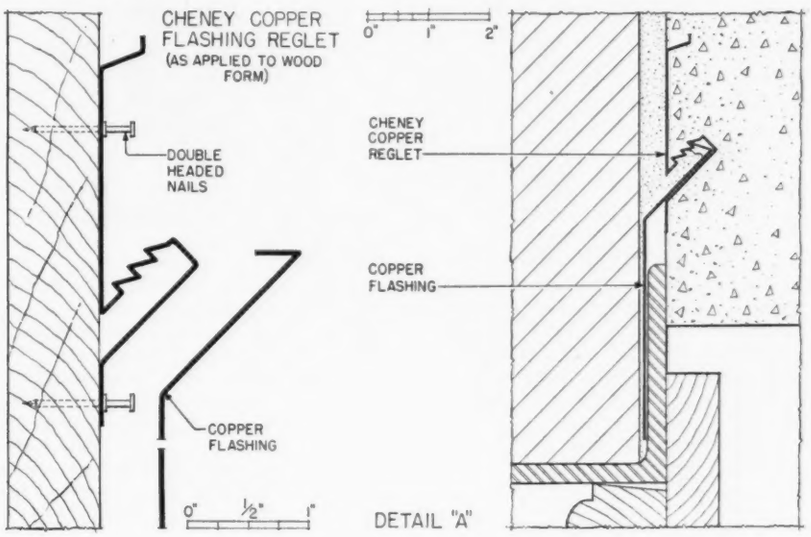
The Timer may be manually set to close the circuit and will automatically break the circuit at a predetermined time for any period from one-half hour to eleven hours.

•47—Spandrel Waterproofing

Revere Copper and Brass Incorporated, 230 Park Avenue, New York city, announces the Cheney system of Spandrel waterproofing, based on an entirely new and different principle.

Details show Cheney flashing (16 oz.) or Three-Way flashing (10 oz.) carried completely through the wall continuously around the entire building at the top of the spandrel beam as near as possible to the line of the finished floor. Cheney flashing Reglet of 16 oz. copper is nailed to the forms so that a 45-degree slot is formed at the bottom of the concrete beam just above the top of the lintel angle extending six inches beyond each end of the opening below. During construction, after the lintel angle is in place, a piece of plain copper flashing bent to detail is inserted full depth into Cheney flashing Reglet, the upper surface of which is of sawtooth design, thereby locking the flashing firmly in place.

Advantages claimed are: Simplicity of installation, permanency, weephole drainage, and low cost.



New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 99.

48—Niteair Attic Fan

The Lau Blower Company, Dayton, Ohio, announces a new 1939 Niteair attic fan for summer home cooling.

Basically, the Niteair attic fan consists of a 4-blade fan driven by a belt by an electric motor. The housing has been sprayed with a sound deadening material. The feet of the all-metal housing are of rubber. The motor and bearing mount are mounted on rubber. There is a special spring on the fan shaft to deaden vibration. The pillow block on the fan shaft is self-aligning.

Niteair attic fan is sold as a fan unit; also as a package unit with ceiling

grille, vent box and accessories and as fan unit with protective grille. In appearance, the Niteair fan is attractive, with brown two-tone crackle finish. Fusible link, automatic trap door switch and all metal fan housing and vent box make Niteair attic fans fireproof.

An automatic time control switch is supplied at slight additional cost. The switch consumes no electric current itself, but shuts off the fan at the time set on the control.

The fan is installed in the center of the attic or in the sidewall, depending upon the design of the house. It draws air through a ceiling grille or attic stairway from the rooms below, creating a constant flow of fresh air all through the house. The air currents plus the removal of the hot dead air blanket in the attic make the home cooler.

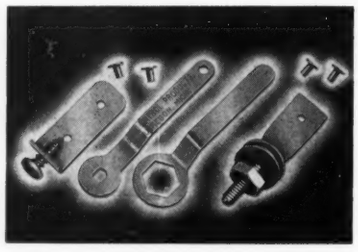
◆

•49—Damper Control

Air Control Products, Inc., Muskegon, Mich., announces a simplified control for dampers in forced air ducts.

Ease of installation is assured by designing the control so that the tail bearing does not project beyond the edge of the damper. With this control, dampers in even the smallest ducts may be readily installed without bending.

With this control, both ends of the



damper are tightly secured to the duct, thereby providing a double protection against vibration or rattling.

The damper is operated by a handle which can only be installed in the same plane as the damper itself, thus providing a positive indication of the angle of the damper inside the duct. To make the damper proof against unskilled attempts at adjustment, the handle may be removed.

Bearings are of one-piece construction, made like all other parts, of heavy, case-hardened, cadmium plated steel.

◆

•50—Automatic Water Heater

Lochinvar Corporation, 14247 Tireman Ave., Dearborn, Mich., announces an automatic oil-burning water heater in four sizes—20, 30, 40 and 50 gallon storage. The round casing furnished with the 20, 30 and 50-gallon sizes is finished with gray body, the top and vestibule covering controls are in ma-

roon. The 40-gallon size comes with round casing and cabinet-type square casing. The square casing is finished in ripple green enamel.

The Lochinvar multiple stage burner is said to be noiseless in operation. As the oil flows into the burner, it hits the hot steel bottom, immediately vaporizing. A mixture of this vapor and the oxygen admitted through the perforations in the sides of the burner forms a gas which burns. When the unit is on low fire, it will burn off of the lower baffle of the burner—when on high fire, the upper baffle.

51—Duct Booster Fan

Universal Blower Co., Birmingham, Mich., announces a duct booster fan for conversion of the cold air duct of a warm air furnace into a forced draft installation for the sluggish system.

The unit consists of a motor, a 12-in. displacement fan, electrical connector, a supporting bracket, a cover plate and a Fanswitch which automatically turns on the fan when the bonnet heat reaches 150 deg. and cuts it off when it drops to 130 deg. The air capacity is 45,000 cu. ft. per hour.

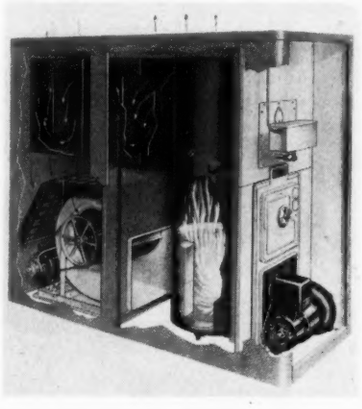
With the exception of filtering, a duct booster fan, plus a humidifier, converts an old-fashioned furnace into the equivalent of a modern air conditioning plant at low cost.

A register booster fan for the "cold room" is also available.

◆

52—New Oil Unit

Round Oak Company, Dowagiac, Mich., announces the introduction of a new single package, oil-fired winter air conditioner for small and medium sized homes, for 1939. Designated as the XA-100 it is a companion model to the smaller X-80 oil-fired air conditioner



announced last year and designed for the small home market.

XA-100 uses Round Oak's own "Contraflow Burner." Capable of producing 110,000 Btu per hour at the hood, it will meet the heating requirements of houses of 7 and 8 rooms.

Regular equipment includes the specially designed oil burning furnace of steel, spun glass filters, multi-blade blower, automatic humidifier, burner and controls. Standard controls consist of a heat anticipating thermostat, combination fan switch and high limit control and combustion safety control for intermittent ignition.

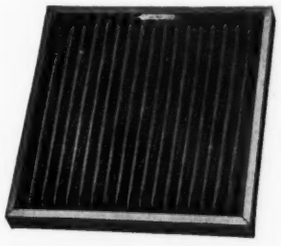
Humidifier is of the evaporating type, finished complete with separate throat valve tank and cover, and accessory fittings. The various heating and air conditioning units comprising the XA-100 are compactly arranged in a surprisingly small cabinet with attractive blue Hammerloid steel finish. Removable doors, front and back, provide easy access to units.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 99.

53—Kleenflo Filter Panels

Air-Maze Corporation, 5200 Harvard Avenue, Cleveland, announces a new type low cost cleanable air filter panel for unit air conditioners, room coolers, furnace blower cabinets and window ventilators. They say exhaustive tests, both in the laboratory and under extreme service conditions, show that Kleenflo panels have an air cleaning efficiency ranging from 98 to 99.6



per cent, with remarkably low restriction during service.

A special feature of Kleenflo panels is their extreme ease of cleaning and charging. They are cleaned by merely swishing them in a pan of hot water or under a stream of hot water. The use of an ordinary insect spray gun for spraying with any inexpensive oil of S.A.E. 20 viscosity is all that is necessary to restore to these filters the performance and characteristics of new filters. Or, panels may be charged by immersing in the oil and allowing them to drain thoroughly.

The patented construction of Kleenflo panel filters consists of a maze of alternately placed and exactly spaced crimped galvanized wire screens of a carefully selected mesh. These screens are arranged with precision so as to create graduated and progressive density and to perfectly embody the baffle-impingement principle of air filtration.

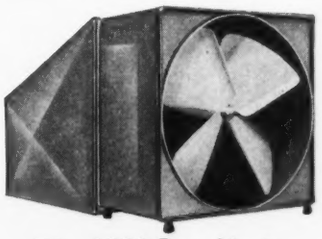
The filter element is rigidly held by a sturdy, attractively finished steel frame.

◆

•54—Zinc Surface Treatment

Maas & Waldstein Company, 438 Riverside Avenue, Newark, New Jersey, has developed a new method of treating the surfaces of zinc, zinc-coated, and galvanized products before finishing them with lacquer, enamel, paint, or varnish.

The zinc or zinc-coated products are dipped in or wiped with a solution of a compound called "Zinsol" which compound causes the formation of an alloy, consisting of zinc and another metal, to form on the surface. This alloy is chemically inert to moisture, the atmosphere, and organic finishes generally, so that it forms a stable foundation for any desired kind of finish.



55—1939 Rex Airate

Air Controls, Inc., Cleveland, announces the new 1939 Rex Airate attic ventilator.

This new model, designed especially for attic ventilation, is a complete package unit including vent-box, ceiling moulding, fan unit, rubber connector and automatic ceiling shutter. Furnished in various sizes and capacities for all types of installations. The ceiling shutter opens when the fan starts, permitting free flow of air from the house into the attic. When operation ceases, the shutter blades quietly close, preventing flies, bugs or mosquitoes, dirt and dust and accumulated heat from descending into the house. A tie-rod connection on the shutter vanes insures uniform opening and closing movement.

An important feature of this new unit is the ease by which it can be installed. The fan housing is greatly improved by a new streamlined venturi inlet and outlet; it is also lined with sound deadening material to further insure quietness.

◆

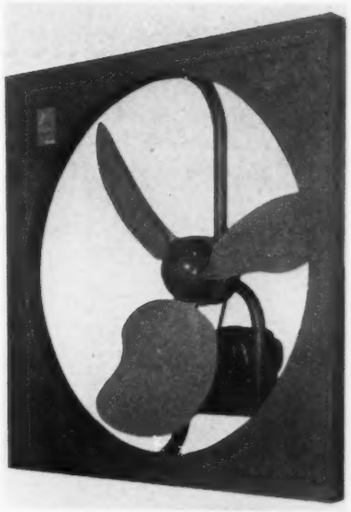
△56—Recording Thermometer

Jas. P. Marsh Corporation, 2073 Southport Ave., Chicago, announces the new Marsh No. 70 "'Serviceman" Recorder—a small, compact, portable, recording thermometer at low cost.

A bi-metallic spiral of advanced design is used in the temperature recorder. Zero adjustment is conveniently made by a screw which follows the idea of the Marsh "Recalibrator."

The chart is rotated by an accurate, fully adjustable clock movement, wound by a convenient knob extending through the back of the case.

A wide variety of charts in Fahrenheit or Centigrade is available covering room temperature, outside temperature, cooling and heating applications.



57—CirCOOLator

Viking Air Conditioning Corp., Main and Center Streets, N. W., Cleveland, announces the new Viking CirCOOLator attic fan. Many of the features can be seen in the illustration, such as: bullet-nose hub which combines the pulley, hub and bearing into one completely sealed, streamlined assembly, and the oddly shaped blade of the Viking "Helixoid" design which has established a reputation for extreme quietness and low power consumption. In the design of this fan precaution has been taken to insure exceptional quietness. The supports are all streamlined and the motor and drive is so located as to avoid creating air disturbances that might produce noise.

The Viking CirCOOLator attic fan is available in three sizes—7,500, 11,500 and 16,500 cfm—and suitable for homes ranging in size from six rooms of 7,500 cubic feet to the larger home of 25,000 cubical contents.

Viking CirCOOLator attic fans are available with complete attic package kits which include all of the fittings needed for attic installation These fittings include the low resistance ceiling grille, trap door with automatic switch and fire link, vent-box with soundproof paneling and all the ropes, pulleys and fittings needed for the installation. As an added item of convenience the Viking Auto Timer is included with each package and permits the fan to be started or stopped after any predetermined time.

◆

△58—Metal Coating

The Fales Chemical Company, Inc., 545 Fifth Avenue, New York City, announces a new transparent protective metal coating which is said to withstand the action of sunlight, moisture and climatic changes. It is claimed that this coating — "Seal-Cote" — has been used successfully with copper, brass, bronze, steel and other metals and has preserved their original finish even when exposed to the weather for at least six months.

It may be sprayed or brushed on.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 99.

59—Improved Solenoid

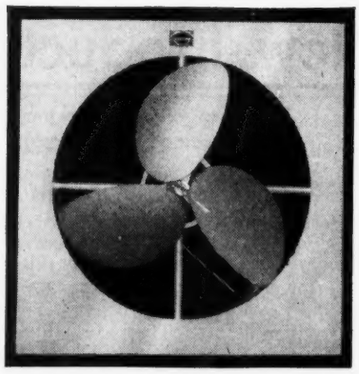
Supreme Electric Products Corporation, 99 Mt. Hope Ave., Rochester, N. Y., has just announced an improved design in solenoid valves.

A plug, containing the seat, is easily removable for cleaning.

Valves will control water, air, gas, oil or steam. Pipe sizes 1/8, 1/4 or 3/8 with 1/16 and 1/8 in. diameter orifice.

60—Premier Furnace Cleaner

Electric Vacuum Cleaner Company, Cleveland, announces an improved, bigger Premier furnace and boiler cleaner. With a bigger bag and sturdier hose, the makers say this cleaner has great efficiency and is built ruggedly for long use, cleaning all types of heating equipment, either cold or under fire. It is ideal for upstairs work.



61—Coolvent

The Autovent Fan & Blower Company, 1809 N. Kostner Avenue, Chicago, announces the re-designed Coolvent attic fan. In designing this unit, the manufacturer has had two major points in mind; namely, a quiet operating unit that provides for easy installation and, second, a unit assuring the greatest efficiency, with minimum cost.

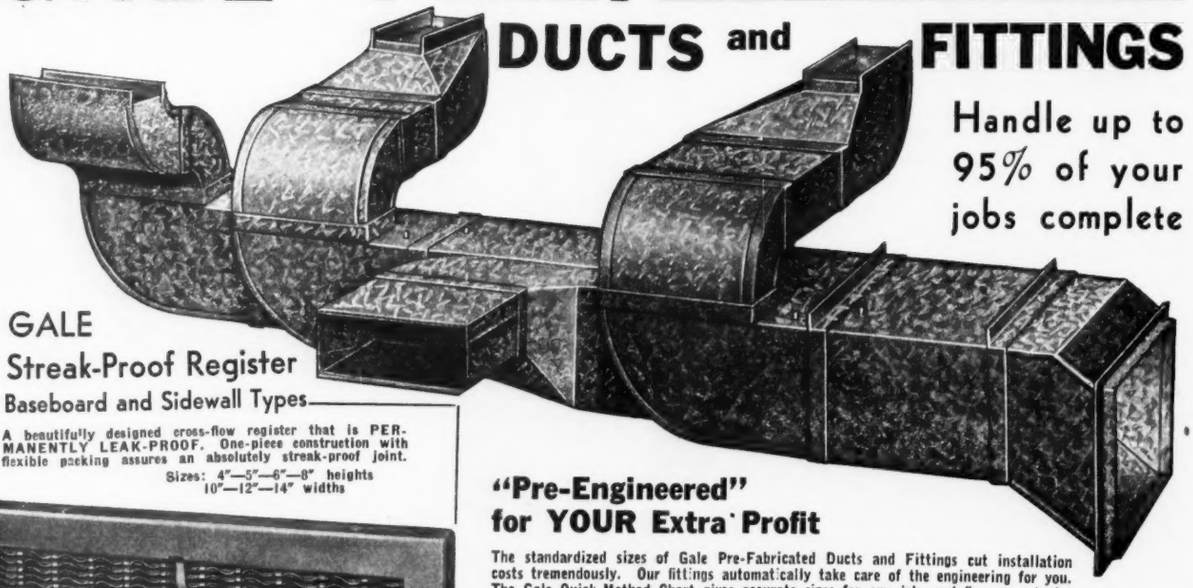
Through the use of carefully proportioned sheaves or pulleys and V-belt drives, the fans operate at slow speeds, of from 281 to 577 rpm. The six sizes of units have capacities ranging from 4070 cfm to 21,100 cfm.

All of the units are tested and rated in accordance with Standard Test Code as adopted jointly by the National Association of Fan Manufacturers and the American Society of Heating & Ventilating Engineers.

GALE "PRE-FABRICATED"

DUCTS and FITTINGS

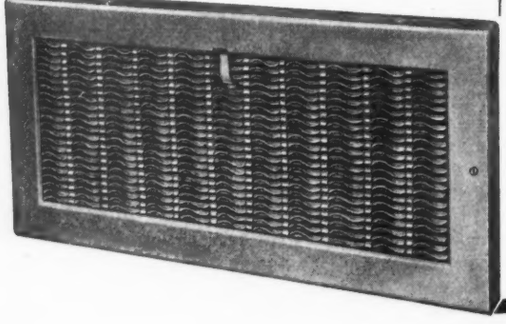
Handle up to 95% of your jobs complete



GALE
Streak-Proof Register
Baseboard and Sidewall Types

A beautifully designed cross-flow register that is PERMANENTLY LEAK-PROOF. One-piece construction with flexible packing assures an absolutely streak-proof joint.

Sizes: 4"—5"—6"—8" heights
10"—12"—14" widths



"Pre-Engineered" for YOUR Extra Profit

The standardized sizes of Gale Pre-Fabricated Ducts and Fittings cut installation costs tremendously. Our fittings automatically take care of the engineering for you. The Gale Quick-Method Chart gives accurate sizes for any job, and figures costs for you. Our Drafting Department will gladly make your plans free of all charge.

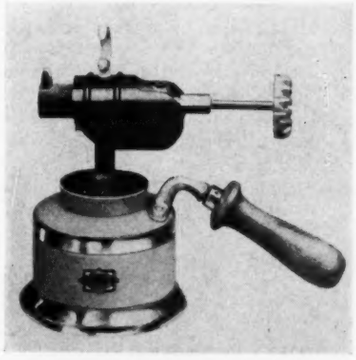
WRITE FOR CATALOG

Investigate at once the savings possible and the modern, uniform installations you can make on every job with Gale "Pre-Fabricated" Ducts and Fittings. Our new catalog gives full details—send for it today.

CHAR-GALE MANUFACTURING CO.
3125 Hiawatha Ave. Minneapolis, Minn.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 99.



▲62—Blow Torch

Baumgarth Manufacturing Company, 836 West Hubbard Street, Chicago, stresses pumpless operation as a definite contribution to safety, ease of handling, and time saving in operating a blow torch.

The Baumgarth torch operates in any position. The flame is absolutely free from soot and carbon monoxide gas, and the temperature is approximately 2400 Fahrenheit.

Accessories—namely, a flame spreading device for burning off paint, large soldering copper, rivet heating and forging pan—at slight extra cost.

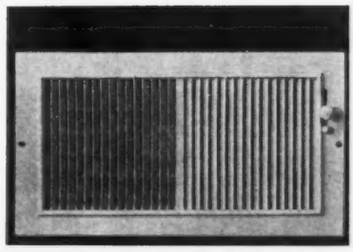
•63—Shear and Flanger

The Quickwork Company, 400 W. Madison Street, Chicago, announces the new Quickwork combination throatless shear and flanger.

As a shear, it handles all straight and irregular cutting, including circles

and curves, concave and convex.

A simple, quick change of heads converts the machine into a flanger which is equally simple and easy to operate. The shoulders of the flanging rolls act as a guide for the depth of flange. Attachments and rolls can also be furnished.



64—Air Control Register

Air Control Products, Inc., Muskegon, Michigan, has placed in production a new register for air conditioning.

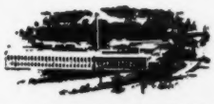
This new register, called the "Air Control," offers full control of the air flow, both vertically and horizontally. Thus the one register can be used throughout an entire installation, and in all locations, regardless of whether duct openings are at the baseboard, high on the wall, in one corner, or elsewhere.

Vertical control of the air flow is secured through a series of movable shutters on the back of the register, which are connected to the knob on the upper right hand corner of the margin.

A small button below the knob is a stop which controls the position of the shutters when open. Any desired angle of deflection may be secured from 15 degrees upward to 30 degrees downward.

Horizontal control of the air flow is obtained by adjusting the vertical fins. A special tool is provided.

"JOHNSON OIL BURNERS Save Us $8,000 a Year"



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MONADNOCK PAPER MILLS

BENNINGTON, N.H.
November 3, 1937

The S. T. Johnson Company
401 North Broad Street
Philadelphia, Pennsylvania

Gentlemen:

In 1936 we decided to equip our stoker fired boilers with oil burners and after careful investigation we chose S. T. Johnson oil burning equipment, which we installed in two 250 HP Dillon H. R. T. boilers carrying a constant load of 150 lbs. steam pressure.

After operating these burners for a year, with a boiler room saving of over $8000.00 and complete satisfaction with added efficiency, we purchased two more 300 HP fully automatic Johnson oil burners so that at present we are operating 100% on oil.

Our experience with your equipment has been highly satisfactory and we are more than pleased to recommend Johnson oil burners.

Very truly yours,

MONADNOCK PAPER MILLS

Treasurer

...MONADNOCK PAPER MILLS

CHOICE of Johnson Oil Burners for Monadnock Paper Mills was only made after careful investigation of all available types of heating equipment.

Monadnock Paper Mills is only one of hundreds of great industrial plants which have found Johnson Oil Burning Equipment not only satisfactory but amazingly economical.

S. T. Johnson Co., one of the nation's oldest and largest manufacturers of oil burning equipment, offers a complete line of domestic and industrial units.

• Worthwhile territories and Johnson franchises available to aggressive dealers anxious to serve their communities with a complete line. Write today giving full details to qualifications.

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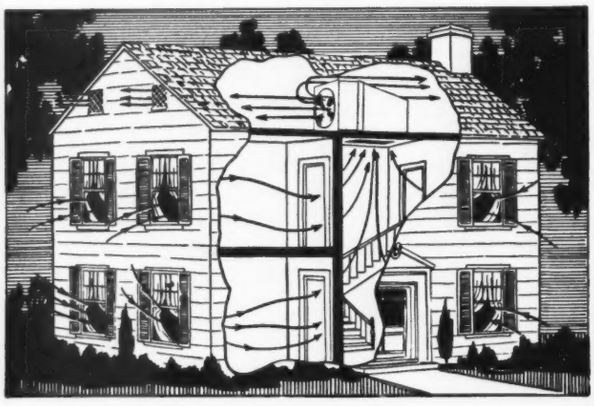
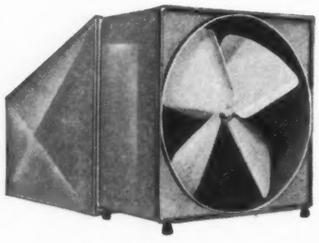
Help You

Earn BIG Summer Profits



Enterprising dealers promoting home cooling by means of attic ventilation find that this equipment is rapidly becoming a universal home necessity and will soon take its place alongside of electric refrigerators, radios and other modern home appliances.



REX AIRATE

Attic Ventilators

REX AIRATE attic ventilators with their attractiveness and ease-of-installation features make sales easier and profits proportionately larger. Now—while hot weather is just around the corner—is the time to prepare for your share of this market.

MAIL THIS COUPON FOR COMPLETE DATA

AIR CONTROLS, INC.
Div. of The Cleveland Heater Co.
1933 West 114th, Cleveland, Ohio

Name .....

Address .....

City..... State.....

A.A.4-9

Association Activities . .

June Convention NWAH&ACA

According to L. R. Taylor, president, great preparations are being made for the mid-year meeting of the National Warm Air Heating and Air Conditioning Association with the Program Committee promising an up to date and helpful program.

A unique entertainment on one evening and the Annual Golf Tournament are among the entertainment features.

This large gathering of the furnace-system industry for air conditioning homes and smaller buildings is to be held in the Stevens Hotel, Chicago, June 5-6-7.

Manufacturers, engineers and heating contractors identified with this growing business always look forward to the meetings of this organization as an easy opportunity to become posted as to new developments.

Allen W. Williams, 5 East Long Street, Columbus, Ohio, is the Managing Director.

◆

Philadelphia Exhibit

The Association of Roofing, Metal & Heating Engineers of Philadelphia, with offices at 1003 Race Street, maintained a booth at the Philadelphia National Home Show held in the Commercial Museum, 34th and Spruce Streets, February 10-18, with an exhibit of roofing of various kinds, gutters and down spouts, furnaces, registers, ventilators, filters, —The Metal Club (Philadelphia jobbers) co-operating.

The purpose of the exhibit was to advertise to the public the existence of a group of permanently established prac-

tical contractors, who as a body would guarantee any contract completed by any one of its members under the association 'Certified" label, and to study the reaction of the public to the display.

Two to four contractors were in attendance at each of the sessions afternoon and evening and were extremely busy answering all manner of questions concerning roofing, insulation, sheet metal work and gravity and winter air conditioning. 30,000 pieces of literature on these subjects printed especially for the exhibit were handed out to those who requested them. Signs containing the name and address of the contributing members were displayed and were carefully examined by those seeking some contractor in their neighborhood. A number of jobs resulted and many inquiries for estimates. The obvious success has resulted in preparation for a more elaborate display later. Requests are still being received over the telephone and by letter. Over 300,000 visited the show.

The association conducted a series of radio broadcasts over Station WIP every Thursday from Thursday, February 2 to February 23rd, and at intervals daily during the week days, as a continuance of the trade association advertising campaign to acquaint the public with the saving, long-life, trouble-free service and safety by having their roofs, sheet metal and warm air heating and insulation taken care of by the mechanical, responsible contractor under the supervision of long experienced experts—Philadelphia business men with places of business in one location for many years.

B. F. JOHN.

RYBOLT

MORE HEAT-POWER
generates greater
SALES POWER

This sums up the value of the RYBOLT franchise to the dealer. RYBOLT Furnaces sell readily and *stay sold* because, above everything else, Heat-Power is what your customers want in a furnace. And RYBOLT gives more Heat-Power—*size for size*—than any other furnace on the market.

The reason lies in extra large, duplex ball-bearing grates which provide ample area for correct air volume and perfect combustion.

Write today for information on this and other advanced RYBOLT features developed through more than a quarter century of quality furnace production.

THE RYBOLT HEATER COMPANY
ASHLAND, OHIO

"SAVED ITS COST MANY TIMES OVER" *says this* LINCOLN *user*

Building a bakery oven unit with a Lincoln Welder

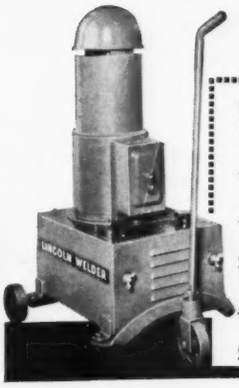
● J. & W. Schiering, sheet metal contractors of New York, N. Y., say, "We would not be without our Lincoln Welder. In the few months we have had it, it has saved its cost many times over. We use it in the manufacture of all our sheet metal work including industrial heating equipment, baking and drying units, restaurant and kitchen equipment, trucks and iron racks, show cases and galvanized ventilating piping. We also use it for the repair and strengthening of our shop equipment.

"Any metal shop not owning a Lincoln Welder is missing a bet!"

You, too, can cut your costs and improve your products with a Lincoln Welder. The sooner you buy one, the sooner you profit. For details, consult the nearest Lincoln office or mail the coupon.

THE LINCOLN ELECTRIC CO.

Largest Manufacturers of Arc Welding Equipment in the World



MAIL THIS COUPON TODAY

THE LINCOLN ELECTRIC CO.
Dept. EE-583, Cleveland, Ohio

Send free copy of Bul. 314 and payment details on the Lincoln Sheet Metal Shop Welder.

Name _____ Position _____

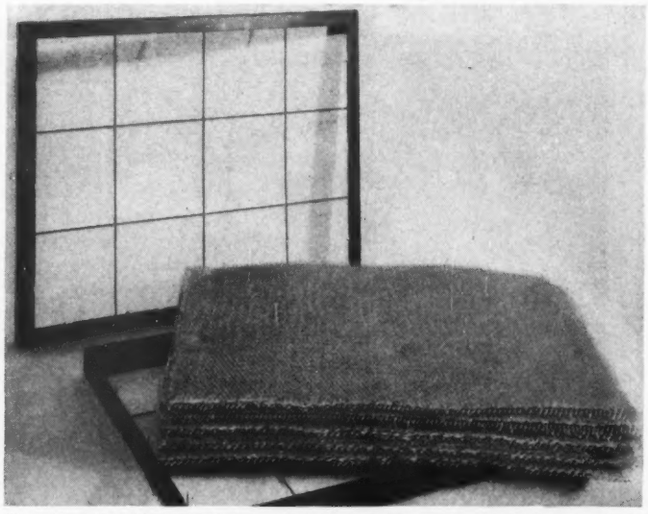
Company _____

Address _____

City _____ State _____

RESEARCH PRODUCTS CORPORATION

Re-Fil-Able "WALTON" AIR FILTERS



Here's the Air Filter you have been waiting for. This new Research Products Corporation Re-Fil-Able "Walton" Air Filter which consists of a permanent steel frame with a removable cover and replaceable trisection filter, once installed in an air conditioning system, will function with the highest degree of efficiency. It also gives you the opportunity to pass on to your customers a saving of approximately one-third of their filter bills, as Research Products Corporation Re-Fil-Able "Walton" Air Filter features save that much in the course of time . . . and assure you of a great volume of repeat refill business at the same time. Research Products Corporation Re-Fil-Able "Walton" Air Filters are the filters that last . . . that remove the dust . . . do not hamper air flow, and in general increase the efficiency of any air conditioning system. Line up with Research Products Corporation Re-Fil-Able "Walton" Air Filters Now . . . Write for full information at once.

RESEARCH PRODUCTS CORPORATION

MADISON WISCONSIN • Manufacturers of--

- **R-P ZEOLITE** — High capacity, long lasting, low cost mineral for softening water.
- **FILTERAG** — An efficient filter medium for filtering water and liquids.
- **ALKALEX** — A carbonaceous cationic exchanger for removing alkalinity from water.
- **BIRM** — The effective, inexpensive mineral for removing iron from water.
- **AIR-FILTERS** — Made of expanded fibre, high dirt removal efficiency, low resistance to air flow.

LOCKFORMER 22 AT A REASONABLE PRICE

IS A BIG PROFIT-MAKER FOR YOU!

WHY? Through QUANTITY PRODUCTION, costs have been GREATLY REDUCED, and a good Production Machine made available TO EVERY SHOP!

A MULTI-PURPOSE Forming Machine for PITTSBURGH LOCKS, DOUBLE-SEAM LOCKS, DRIVE CLEATS, etc.—backed by years of experience in the building of Lock-Forming Machines.

Capacity, 22-gauge and lighter—ONE MAN can do more work IN ONE HOUR on a Lockformer, than TWO MEN can do IN ONE DAY by old-fashioned methods.

Efficiently designed and ruggedly constructed.

Machine shipped complete — operates from light socket. Price $270.00 f. o. b. Chicago, with Pittsburgh Lock Rolls only —Rolls for other purposes at small additional cost.

Get your order in EARLY for prompt Delivery.

For complete information, see your jobber or write

THE LOCKFORMER CO., 4630 Flournoy St., CHICAGO, ILLINOIS

Association Activities . . .

Galvanizers Spring Meeting

The sixth meeting of The Galvanizers Committee will be held at the Hotel Statler, St. Louis, Missouri, on Monday and Tuesday, April 17th and 18th.

During the convention a special exhibit of galvanized products will be on display.

F. G. White, Chairman.

◆

Chicago

The second educational night sponsored by the Furnace, Air Conditioning and Sheet Metal Institute was held Thursday night March 23rd at the meeting hall, 3159 Southport.

Art Meiche of Furblo continued the heating and air conditioning school during which a quick estimate chart for figuring pipe and riser sizes and trunkline sizes was presented. There was also interesting discussion on how the chart was to be used. Among other things of importance discussed was the Sales Tax situation.

The meeting ended with refreshments served up by the able John Novak, entertainment chairman.

◆

Pennsylvania

The 1939 convention of the Sheet Metal and Roofing Contractors' Association of Pennsylvania will be held June 15 and 16, at the General Broadhead Hotel, Beaver Falls.

M. F. Liebermann, Secretary.

◆

New York Auxiliary

The Merchandisers Association Auxiliary to New York State Sheet Metal, Roofing & Air Conditioning Contractor's Association, Inc., was formed at Albany at the recent state convention.

The officers elected were:

A. E. Kirchgraber, President; J. M. & L. A. Osborn Company.
A. A. Stagg, 1st Vice Pres.; U. S. Register Company.
J. W. Stoner, 2nd Vice Pres.; The American Brass Company.
F. O. Carfer, Treasurer; Wheeling Corrugating Company.
C. H. Lighthart, Secretary; Furblo Company.
A. C. Detmers, Sergeant at Arms; J. M. & L. A. Osborn Company.
L. P. Doty, Director; Follansbee Company.
R. J. Milholland, Director; American Radiator Company.
C. E. Clifford Director; The Kent Company.
Walter Smith, Director; Wheeling Corrugating Company.

The objects of the organization are to unite into one organization those persons who are engaged in merchandising materials, equipment, advertising or services to the sheet metal, roofing and air conditioning contractors of New York State; to formulate standards, principles and a code of ethics for the conduct of business with these contractors; to act as a central agency through which will clear information, suggestions, grievances and other such matters as may promote harmony and good will and the best interests of both associations and their individual members; to aid in the advancement and expansion of the sheet metal, roofing and air conditioning industries in all their markets for the greatest welfare of these industries; to encourage equitable legislation and public support for these industries.

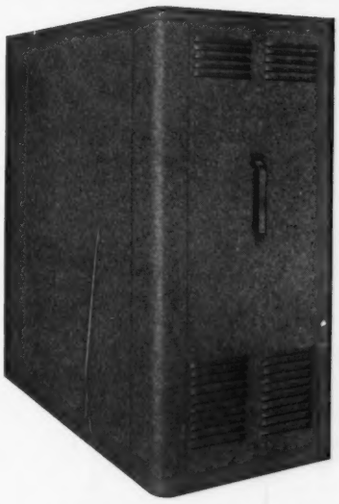
The active membership shall be composed of persons of good character and good business reputation who are at present actively engaged in executive, sales, advertising and sales promotional capacities pertaining to the merchandising of materials, equipment, advertising or services to the roofing, sheet metal and air conditioning contractors of New York State.

Applications for membership may be made to the secretary, C. H. Lighthart, 254 Court St., Buffalo.

Obituary

Jacob Seither, president, Seither & Cherry, 25 South Fifth Street, Keokuk, Iowa, passed away recently. Mr. Seither came to Keokuk from Bavaria in 1880 at 12 years of age and has operated a plumbing, heating and sheet metal contracting business in Keokuk for many years. The business will be carried on by his son, Al Seithers, well known in the industry.

Here's a lead-off value in a
GREAT FURNACE LINE



X-80
OIL FIRED
AIR CONDITIONING
FURNACE FOR
SMALL HOMES

This revolutionary heating development is breaking the small home market wide open for Round Oak dealers. Sold as a package unit complete with burner, blower, heaters, filter, humidifier and controls. Priced right, the X-80 is a real lead-off value in any heating market.

OTHER FURNACES, TOO!

With the addition of several units to both its coal and oil burning series, Round Oak today offers the most complete line of warm air furnaces and air conditioning equipment in its history...a well rounded line that talks in terms of real profits to any dealer. And every unit is an outstanding value, backed by the enviable reputation Round Oak has held since 1871. WRITE TODAY FOR COMPLETE INFORMATION.

ROUND OAK COMPANY, DOWAGIAC, MICH.

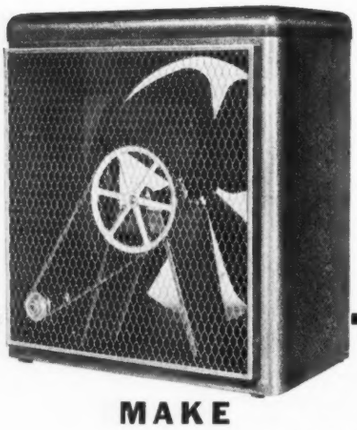
AIRKLENZER UNITS

Offer the home owner coal heating economy with all the comfort of winter air conditioning. Furnished with either cast or steel furnaces in several sizes. For hand coal firing, stoker firing or oil burning. Outstanding Round Oak values in every respect.

THERE ARE A FEW CHOICE TERRITORIES OPEN FOR WIDE AWAKE DEALERS. WRITE OR WIRE!

ROUND OUT
with
ROUND OAK
THE COMPLETE LINE OF
WARM AIR EQUIPMENT

Two-tone crackle finish brown NITEAIR
"The Attic Fan with eye-appeal"



MAKE

Summer Profits

with LAU

NITEAIR

ATTIC FAN

A quick-selling, *low-priced* unit that cools by moving air. Millions of "hot" prospects!

• America is "sold" on summer cooling. Dealers selling low-priced, efficient Lau Niteair Attic Fans stand to make big profits. You can too!

NITEAIR ATTIC FAN cools homes, offices and stores according to a scientifically proved air cooling principle — cooling by moving air.

Lau NITEAIR ATTIC FAN has all-metal housing and vent box—is fire-proof. Rubber mounting between unit and floor, on motor and bearing mountings, make NITEAIR virtually noiseless. Housing sprayed with special sound-deadening material.

Sells as a fan unit; or fan with front grille for public view; or package unit, complete with accessories.

Your Profit Goes Up with the Thermometer!

NITEAIR is simply constructed and easily installed. *Priced much lower than you'd expect.* Practically sells itself. NITEAIR was a big success last summer. Lau's new, improved models are headed for a big season. Liberal discounts. Cash in on NITEAIR'S success!

Mail coupon for information and dealer proposition today to The Lau Blower Company, manufacturers of NITEAIR ATTIC FANS: also complete Blower Assemblies and Pillow Blocks.

MAIL COUPON TODAY

The Lau Blower Co.
934 E. Monument Avenue
Dayton, Ohio

Gentlemen: Please send me descriptive literature, list of sizes, performance data, and prices of the NITEAIR ATTIC FAN.

Name .....

Street .....

City..... State.....

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

126—Thermo-Drip Humidifiers

Automatic Humidifier Co., Cedar Falls, Iowa, is distributing a small folder illustrating and describing their Thermo-Drip heat regulated humidifiers for warm air furnaces.

◆

127—Steel Mixture Combustion Chamber

McLeod & Henry Co., Inc., Troy, N. Y., is distributing a 4-page folder illustrating and describing their steel mixture combustion chamber for domestic oil burners. Installation instructions, firebox data and capacities are included.

◆

128—Ornamental Straps and Leader Strainers

Rival Strap Corporation, 308 West 20th Street, New York City, offers free publicity to dealers on their ornamental straps for downspouts and leaders. Dorothy Ducas, in short newspaper articles features "Rival" and "Fitrite" ornamental straps and reprints are offered for bulletin boards or windows. Another release features roof strainers for outside leaders.

◆

129—Attic Fans

Chelsea Fan & Blower Co., Inc., 370 West 15th Street, New York City, is distributing a new catalog entitled "Fans by Chelsea." The various attic fans are illustrated with price and specifications sheets, all preceded by a 6-page reprint entitled "Attic Fans for Summer Cooling of Homes."

The new apartment cooling fan is included.

◆

130—Air Conditioning Conference

The Engineering Experiment Station, University of Illinois, will release soon a circular comprising the papers presented at the 1939 Conference on Air Conditioning held at Urbana on March 8 and 9, including the address of Dr. Charles Sheard of the Mayo Clinic and the Mayo Foundation, entitled "Physiological Responses of the Body to Its Environment." This circular will be free for a limited period of time to those who make direct application for it.

◆

131—Cheney Flashing

Revere Copper and Brass Incorporated, 230 Park Avenue, New York City, is distributing a 16-page booklet illustrating and describing their Cheney flashing—the flashing that bonds in every direction. Photographs and details clearly illustrate the use of the copper flashing. Two new products—Three-Way 10 oz. Flashing and Cheney Spandrel Waterproofing (16 oz.)—are announced. Flashing specifications cover exposed work, concealed work, spandrel waterproofing, concrete parapet, and vertical ribbed siding. Copies are available.

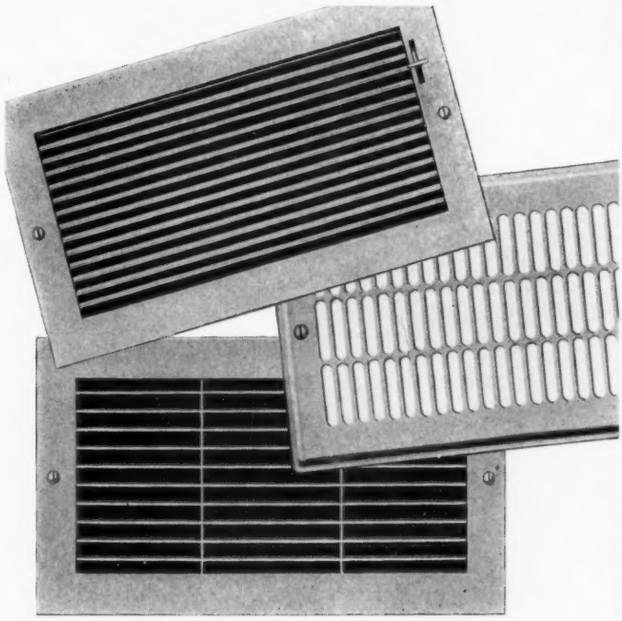
◆

132—Steel Roofing Products

Republic Steel Corporation, Cleveland, offers information on special and standard steel roofing products in a 32-page, two-color catalog entitled "Republic Steel Roofing Products."

Many styles and products of roofing are illustrated and described. These include, in addition to such specialties as Republic Triple Drain roofing and accessories, Republic Super-Dry roofing and Taylor roofing ternes, V-Crimped roofing, Self-Capping roll roofing, roll and cap roofing and corrugated roofing. Two other products, outside of the roofing products field, are highlighted—Republic galvannealed sheets and Enduro stainless steel sheets.

Complete tabular information is incorporated covering standard weights per square, in pounds; estimating table for roofing products; allowances for laps on corrugated sheets; extras on galvanized or painted roofing and siding; rolling limits; freight per square on all forms of galvanized roofing and siding; and bundling tables for flat sheets.



Modern
Air Conditioning Demands *Modern* Registers

There is an AUER model—well styled, correctly designed, carefully made—and appropriate for *every* heating and air conditioning need. Fin-Flex and Dura-Flo reflect the latest improvements in air conditioning register and grille design. The always popular "Classic" face also has been widely adopted for intake use.

Write for complete Auer Register Book 39.

THE AUER REGISTER COMPANY
3608 Payne Avenue Cleveland, O.

AUER REGISTERS
& GRILLES
For Air Conditioning *and* Gravity

Randall PILLOW BLOCKS
Quiet • Efficient • Durable

Randall Standard Pillow Block

Randall One-Piece Steel Housing Pillow Block

Randall Rubber Mounted Pillow Block

Randall Flange or Side Mount Pillow Block

Randall Pillow Blocks are known for their ability to stand up under all conditions of use. They ask no favors and consistently give good service. They are manufactured to a very high standard of the best materials obtainable.

The use of Randall Pillow Blocks eliminates metallic bearing noise throughout the duct system as they run smoothly and quietly. They will operate without attention for long periods and are dependable and extremely long-lived.

Year after year Randall Pillow Blocks remain standard equipment on a majority of all air conditioning and blower units.

Write for 1939 catalog describing, in detail, the complete line of Randall Pillow Blocks.

•

PACIFIC COAST STOCKS

Utility Fan Corp.
Los Angeles, Cal.

C. W. Marwedel
San Francisco, Cal.

EASTERN STOCKS

Tek Bearing Co.
177 Lafayette
New York City

American Stock Gear Co.
100 St. Clair Ave., N. W.
Cleveland, Ohio

Randall GRAPHITE PRODUCTS CORP.
Dept. 411 609 W. Lake St., Chicago, Ill.

Who Said You Were No Merchandiser?

SALESMANSHIP isn't all "slick" talking. Most often it isn't that at all. What one talks about is far more important than how one talks it. And that brings us right up to the fact that "Fire!" is a most forceful word (under certain circumstances) in any language.

People pay plenty for safety and very cheerfully when they really know that they are getting it. Do you regard a dirty heating plant and a soot-clogged chimney as safe? Why not suggest that a good cleaning WILL make the plant safe—plus preventing chimney fires?

While cleaning the plant and chimney—and you make money on that job alone—you will see just what other service should be rendered—new grates, smoke pipes, re-sets, etc. You can show the owner how much it is to his interest to order you to fix the plant, so that it operates efficiently for him, as well as safely.

That's just how thousands of Super heating plant cleaners are making money for furnace men today. Write for Plan Book showing how to sell heating plant service and complete data on how to make a Super pay for itself over and over again.

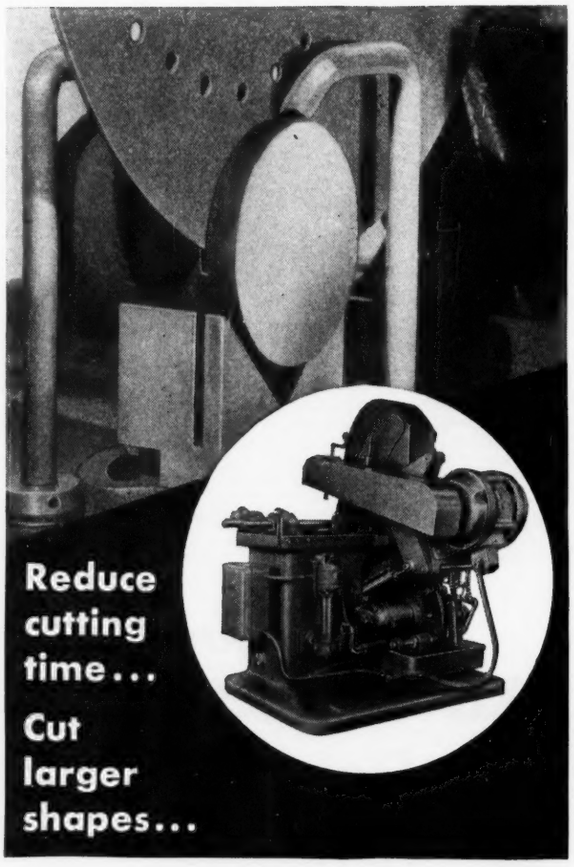
------USE THIS COUPON-------

The National Super Service Company
1944 N. 13th Street, Toledo, Ohio
Send me the Plan Book and complete information about your free trial and the new low-priced Super.

Name .....

Street Address .....

City and State.....



Use

CAMPBELL CUTAMATIC

● The Campbell Cutamatic makes an easy job of cutting shapes up to 6 inches in diameter at the rate of a square inch every 12 seconds. Tough, hard alloy steels and other materials regarded as difficult to cut are handled without the least trouble. Cut surfaces are smooth, free of burrs. Later finishing operations are usually unnecessary.

The Campbell Cutamatic cannot burn or case-harden the material it cuts.

The booklet "Design for Cutting Costs" will show you the way to important economies. Write for your copy.

BUY ACCO QUALITY *in Campbell Cutting Machines, Ford Chain Blocks, Page Welding Electrodes, American Welded and Weldless Chains, Lay-Set Preformed Wire Rope and Reading-Pratt & Cady Valves.*

ANDREW C. CAMPBELL DIVISION
DESIGNERS AND BUILDERS OF SPECIAL MACHINERY
BRIDGEPORT, CONNECTICUT

ACCO

AMERICAN CHAIN & CABLE COMPANY, Inc.
In Business for Your Safety

New Literature . . . .

For your convenience in obtaining copies of New Literature, use the coupon on this page.

133—Refractories

The Pyrolite Products Co., Refractory Engineers, 1221 W. 74th St., Cleveland, Ohio, is distributing four folders covering their products—Pyrolite ready-mixed aluminum paint and heat resisting black, Heat-Aid plastic furnace lining, Nu-Dry furnace cement, and Radolite asbestos furnace cement. Dealer prices are included.

◆

134—Cooling and Ventilating Sales Manual

Kisco Company, Inc., 39th & Chouteau, St. Louis, is distributing "Breezy Tales of Summer Sales," which they say is chuck full of profit-making ideas for those interested in cooling and ventilating equipment.

"Breezy Tales of Summer Sales" is a photo-manual—visible and tangible evidence of successful applications, they say—prepared to acquaint the trade with the Kisco "Deflecto" ceiling model air recirculators, with and without indirect lighting and with Kisco Exhausters for every application.

◆

135—Prefabricated Duct and Fittings

Lamneck Products, Inc., 416 Dublin Avenue, Columbus, is distributing Series 700 catalog of prefabricated duct and fittings for forced air heating and air conditioning systems, with three systems suggested. List prices are included.

A 20-page Engineering Guide is also offered, giving complete instructions for designing air distribution systems with the use of Lamneck Series 700. Included is a typical friction design layout; work sheet; capacity, velocity, friction, and register area charts. Service features offered are enumerated.

Lamneck Installation Manual gives complete instructions for installing the Series 700 prefabricated duct and fittings. Installation procedure is illustrated and described, standard stack combinations are given as well as stacking instructions. Detail drawings are furnished for setting baseboard and wall type frame and stack head; setting stackhead; stack length and fittings below floor, for round branches, return air stacking, return air grille with stackhead using stud and joist space, and bathroom vents. Fittings are illustrated. Duct installation instructions are included with detail drawings for setting the plenum chambers, assembling duct sections, connections and attaching connections and joining duct sections, cutting, hanging, collaring, assembling large increasers or reducers, installing takeoff fittings, followed by illustrated assemblies.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature."

(Circle numbers in which you are interested):

39	40	41	42	43	44	45
46	47	48	49	50	51	52
53	54	55	56	57	58	59
60	61	62	63	64		
126	127	128	129	130	131	132
133	134	135				

Name .....Title.....

Company .....

Address .....

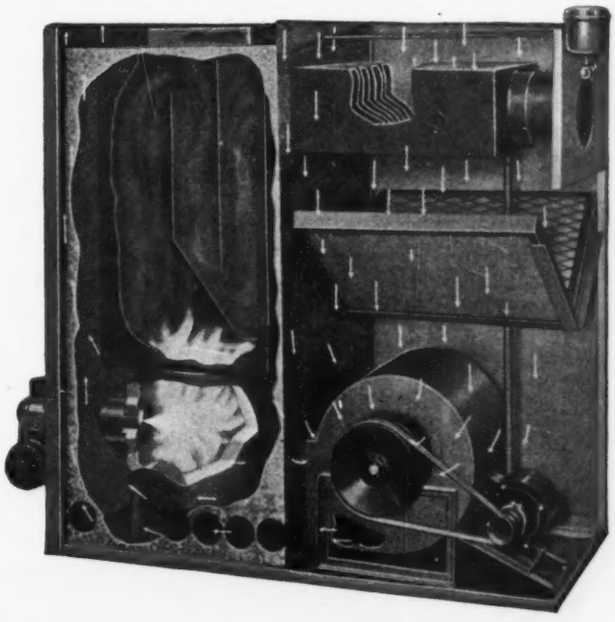
Are you Manufacturer——Jobber——Dealer——

Engineered

FOR THE SMALL HOME

Priced

FOR THE SPECULATIVE BUILDER



THE NEW SMALL YORK FURNACE

● Here's your golden opportunity—a new York warm air furnace which is the finest small-home oil heating plant ever engineered at a price which fits the speculative builder's needs.

It's the result of 42 years of experience in the manufacture of oil burning equipment plus the new market-wise engineering at York.

This unit is a completely engineered job. Every part is built to fit every other part. The entire unit can be set up in a home in 30 minutes! And once it's set up, it's there to stay.

LOOK AT FACTS

The cutaway tells a good story—a story of York quality in every detail. Follow the air, see it pass over the special York economizer. Notice the 25% oversized air filters. Make a note that the fan is the adjustable-speed type found on the larger units. See the molded-in combustion and the faithful York oil burner. See the hot gases rise, and weave about the York baffles until their heat has been extracted. Baffles are partly responsible for the remarkably low stack temperature.

HUMIDITY IS CONTROLLED

The humidifying system is another example of the sound engineering detail in this furnace. For the first time an easily adjusted, scientifically sound method of air humidifying is presented to the small home market. Automatic copper float is outside away from bubbling disturbance. So is the seasonal adjustment knob.

THREE POPULAR SIZES
RANGING FROM 85,000 B.T.U. to 154,000 B.T.U.

There's plenty of heat in these models and plenty of long life and faithful service, too.

Write us for further information.

YORK OIL BURNER COMPANY

A subsidiary of Thomas Shipley, Inc.

YORK, PENNA.

With the Manufacturers . . .

George A. Brandel

George A. Brandel for the past fifteen years identified with roofing and sheet metal building products in sales and executive capacities has been appointed Manager of Jobber Sales for Berger Manufacturing Division, Republic Steel Corporation, Canton, Ohio.

◆

Delahanty Joins Peerless

I. F. Delahanty has been appointed Manager of Sales and Promotion of the Fan and Blower Division, Peerless Electric Co., Warren, Ohio. He was formerly with the Research Department of National Radiator Corporation and started in the industry with Carrier Corporation.

◆

Trane in Southern California

The Trane Company, LaCrosse, Wisconsin, announces the appointment of English and Lauer, Inc., 1978 South Los Angeles Street, Los Angeles, as exclusive representatives of the entire Trane line of heating, cooking and air conditioning equipment in Southern California, effective since January 10.

◆

Harvey-Whipple 1939 Radio Advertising

Ray G. Whipple, treasurer and general manager of Harvey-Whipple, Inc., announces the start of the 1939 Master Kraft Magic Melodies Radio Programs, over WJZ on March 22nd.

This series of radio broadcasts, Mr. Whipple states, has not only netted sales of burners and air conditioners for dealers, but in many cases has put dealers in touch with other work of an allied nature, such as plumbing and heating jobs.

The Magic Melodies Programs will be broadcast each Wednesday evening at 6:30 over WJZ, N. Y.

Armco Sheet & Strip Sales

A home office reorganization of the Sheet and Strip Sales Division has been announced by W. W. Sebald, Vice President of The American Rolling Mill Company, Middletown, Ohio.

F. A. Tobitt has been appointed Manager of Eastern Sales, J. A. Ingwersen, Manager of Midwestern Sales, and G. W. Breiel, Manager of Southern-Western Sales.

◆

National Distributors Convention

The Schwitzer-Cummins Co., Indianapolis, Indiana, manufacturers of Stokol stokers and Hy-Duty blowers, held a national distributors convention at the factory February 27th to March 2, inclusive.

Louis Schwitzer, President, introduced several new products—the Stokol Mercury line with 2- and 3-step reduction transmissions with capacities from 15 to more than 50-lb. per hour, and Stokol-Heat units with capacities of 100,000 and 200,000 Btu were shown for the first time. This last unit combines a warm air furnace, a stoker, blower, filters and humidifier, with a control panel.

A 5-point merchandising program was announced.

A new low priced dependable
ATTIC FAN CONTROL

Also Suitable for Store Lighting and other Timed Switching

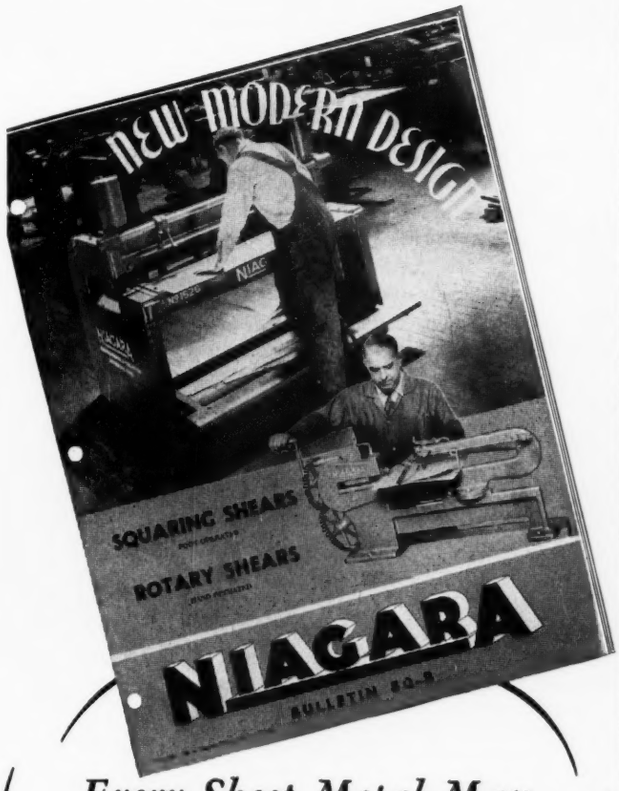
HERE'S a new line voltage time switch, designed primarily for attic fans but also applicable for store window lights or other electrical equipment where the current supply is to be automatically turned off at a predetermined time. This new M-H control is equipped with a dependable Con-Tac-Tor Mercury Switch, an exclusive feature. Operating direct on line voltage it requires no relay. It is equally applicable for new and old installations. This new time switch is an M-H quality product throughout, yet is exceptionally low priced. Be sure to stock and recommend it for every possible time switch application. Minneapolis-Honeywell Regulator Co., 2726 4th Ave. S., Minneapolis, Minn. Branch or Distributing offices everywhere.

A Quality JOB AT A COMPETITIVE PRICE

DEPENDABLE CONTROLS COST LESS THAN SERVICE

MINNEAPOLIS-HONEYWELL Control Systems

BROWN INDUSTRIAL INSTRUMENTS



Every Sheet Metal Man should have THIS BOOK

Send for your copy of this Book,—it shows you how the new modern design of Niagara Squaring Shears gives you easy foot operation, clean smooth cuts, lifelong dependability and economy. It also shows the complete line of Niagara hand operated Rotary Shears for the 101 jobs requiring curved pieces. Your copy is ready for you, write for it right now.

NIAGARA MACHINE & TOOL WORKS
637-697 NORTHLAND AVE., BUFFALO, N. Y.
Branches: Cleveland Detroit New York

NIAGARA

Asbestos Protected

DUX-SULATION

THE ALL-PURPOSE DUCT INSULATION

Insulation for summer cooling and winter heating jobs. High sound absorption and efficient thermal insulation. Yes, and it is easy to apply . . . comes complete . . . nothing else to buy . . . eliminates using lugs, screws, bolts or wire. Safety Protected . . . lasts indefinitely and makes a finished job of unmatched beauty. Use only Genuine Dux-Sulation *(patented)* for Air Conditioning balance and control on your next job. NATION-WIDE SERVICE! Write office nearest you for full information.

GRANT WILSON, INC.
4101 West Taylor Street CHICAGO

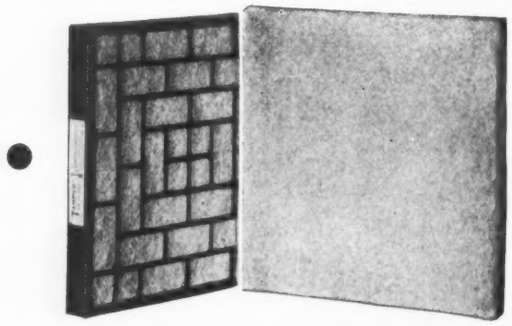
PLANT RUBBER & ASBESTOS WORKS
537 Brannan Street SAN FRANCISCO

AIR CONDITIONING UTILITIES CO.
8 West 40th Street NEW YORK

ATLAS ASBESTOS CO., LTD.
110 McGill St. MONTREAL, CANADA

TAMPICO AIR FILTERS

Replacement Type



HERE'S real efficient, low cost air filtering backed by many years of experience in the air conditioning industry. Tampico Air Filters, combining such features as Low Air Resistance . . . Maximum Dust Capacity . . . Flameproof . . . Long Life and the fact that they are Odorless, with right price in either fiberboard frame or pad types, meet every market and do every job. Tampico Air Filters are progressively packed for utmost efficiency and come in all standard sizes. They are the filters you should handle. . . . Write for full information and prices today.

CHICAGO FILTER CO.
JOLIET - - - - ILLINOIS

STAR BRAND

FOR EASIER, BETTER RIVETING

Star Brand Rivets mean faster, smoother going on any riveting job —and assure best results.

Precision manufacture and rigid inspection insure accurate sizes and uniform quality.

Rivets are an important trifle. Use the best—Star Brand—the standard of quality for 76 years.

If your jobber or dealer can't supply you—write direct.

COPPER BRAZIERS AND TINNERS' RIVETS
ROUND, FLAT AND COUNTERSUNK HEADS
★ ALSO SPECIALS FROM
BRASS, BRONZE, NICKEL-SILVER
EVERDUR, MONEL, NICKEL
AND OTHER NON-FERROUS METALS

OTHER PRODUCTS
SCREW MACHINE PRODUCTS
STOVE BOLTS - MACHINE SCREWS
MACHINE SCREW NUTS
Special headed & threaded parts made from wire and rod

BLAKE & JOHNSON CO. Est. 1849
WATERVILLE · CONNECTICUT

Abrasive Collector

(*Continued from page* 48)

ot the collector was done for two reasons, first because exhaust mains thus can connect to it without bends and, second, so that wheelbarrows may be passed under the hopperlike refuse discharge outlets on the bottom. Each such outlet has a blast gate of slide pattern. Outlets terminate 5 feet above the ground. All exterior sheet metal work is aluminum painted.

In the interior mains, air velocity is 3,600 feet per minute; velocity in branches is 4,300 fpm; 3-inch static pressure being maintained at wheel hood throats. Although there is a 50-h.p. motor connected to the fan, considerable saving in power is effected by cycling parts of the suction piping according to need. Blasting operations are conducted at night, following cooling of foundry work. Then grinding, trimming and other finishing processes are conducted during the daytime. So, the sanding room is shut off during the day and the grinding duct at night. This assists parts of the system in use, also increases the efficiency of the collector. Dust separation is asserted to approach 96 per cent.

◆

Gas Heating Standards

(*Continued from page* 71)

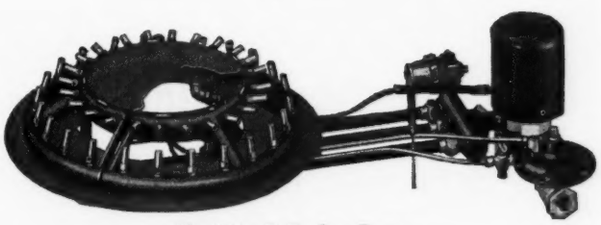
XI. General
Copy of Specification Form.
Drawings showing Structural Details for Good Duct Work Practice.

A compact set of rules like the Gasco Installation Guide are of tremendous importance to all gas utilities. Not only are such a set of standards absolutely necessary to the continued and deserved popularity of winter air conditioning, but the acceptance and conformance to them by the installers can only be controlled by intelligent utility guidance.

As has already been mentioned the Guide represents best practice and not minimum standards. There is, however, room for a lower set of standards to take care of the very low-priced, speculative house. At first the idea of a double standard may seem unnecessary, but to many such a procedure will offer the most logical solution. In the first place the Guide is written in "should" and "would" language. There is no attempt to "demand" anything on the part of the gas company —rather it recommends. As a matter of fact a form has been furnished for compromises where they are agreed upon by the contracting parties. But on those items where safety and a reasonable amount of comfort are at stake, there can be no compromises.

Such decisions as to whether to use a clock or manual thermostat, insulate duct work, put canvas connections in trunk lines, noise and many others, are items on which compromises may be made and the user may still have a reasonably comfortable home. But such decisions as sizing the unit, care in its erection, ample supplies and returns, adequate dampers, etc. are

Naturally, Dealers Prefer BARBER BURNERS —They *Stay* Sold!



No. 324—B Barber Burner

A "HALF-BAKED" burner not only burns up the gas, but burns up the dealer. *Claims* for efficiency, and an actual 20-year *record* of efficiency, are two different things. Barber Burners have proved their superiority in installations running high into the thousands. Remember—your sales will often rise or fall by what one customer tells another. It's good business to bank on Barber—and build your *own* record of selling gas burner satisfaction!

The "B" Model shown comes in 8 sizes for round grates 12" to 34" in diameter. There is also a wide range of sizes for oblong grates. Both round and oblong conversion burners now adjustable at time of installation to fit combustion chamber. Patented BARBER Jets insure complete combustion with *highest flame temperature* on atmospheric pressure, and a "scrubbing" flame action on walls of firebox. No fire brick or refractory elements needed. Baltimore Safety Pilot. Listed in A. G. A. Directory of Approved Appliances. Ask for Catalog and Price List on Conversion Burners for Furnaces and Boilers, Burner Units for Gas Appliances, and Gas Pressure Regulators.

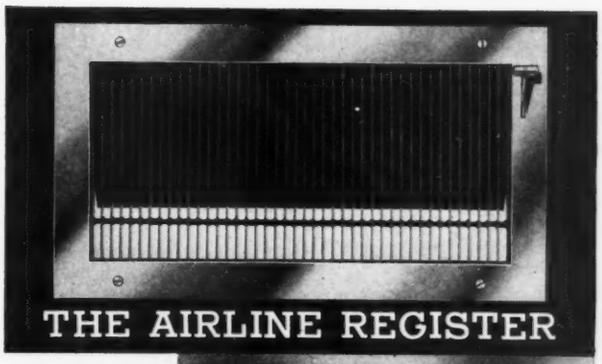
No. 104—B Barber Burner

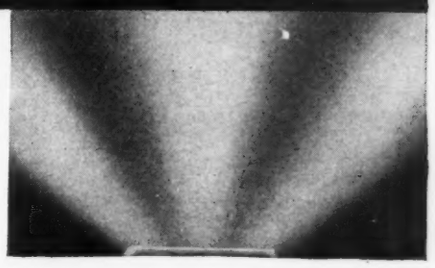
THE BARBER GAS BURNER CO.
3704 Superior Ave. Cleveland, Ohio
Address Michigan Inquiries to
The Barber Gas Burner Company of Michigan
4475 Cass Ave., Detroit, Michigan

BARBER *Automatic* JET GAS BURNERS

● for Warm Air Furnaces, Steam and Hot Water Boilers ●

and Numerous Other Heating Appliances





Unretouched photograph of smoke test showing air distribution from 3-way deflection setting of Airline Register.

MADE RIGHT TO WORK RIGHT

The Airline Register has been called the Standard of Comparison of Air Conditioning outlets. Sturdy in construction, unobtrusively modern in appearance, it is above all a register you can depend upon to give scientifically correct air distribution whatever the requirements of the job. Provides for fixed deflection of bars with vertical or horizontal setting. Four frame constructions, either single or multi-shutter dampers. Surprisingly inexpensive. There's less worry—less headaches when you standardize on the Airline.

Have you Catalog No. 39 R handy? If not write us today.

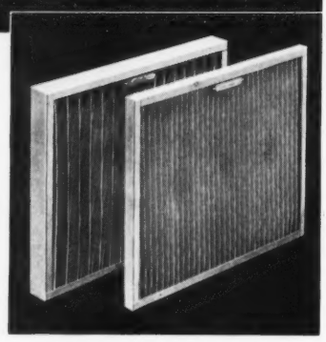
T & B
Trade Mark

BOSTON NEW YORK
PHILADELPHIA
CHICAGO

TUTTLE & BAILEY, INC.
NEW BRITAIN, CONN.

MOST ECONOMICAL FOR ORIGINAL INSTALLATIONS OR REPLACEMENTS

AIR-MAZE
Kleenflo
FILTER PANELS
For
Residential
Air Conditioning



Permanent • Cleanable • Efficient • Low-Priced

The new AIR-MAZE air filter panels have a tested efficiency of 98% to 99.6% efficiency with extremely low pressure drop. Yet their initial cost is only slightly higher than that of conventional throwaway filters.

Cleaning, a simple inexpensive operation is required only at long intervals. After each servicing—costing only a few cents—KLEENFLO panels *again have the performance and characteristics of new filters.*

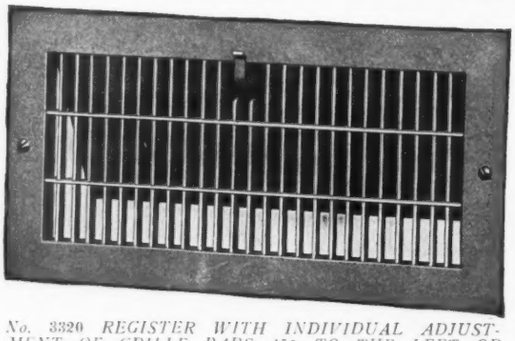
Of all-metal construction KLEENFLO panels are fire resistant, odorless, dependable, non-clogging and will last for years. Standard in size, they slip readily into spaces previously occupied by conventional filters.

Write for Bulletin KCP 118 and prices.

AIR-MAZE CORPORATION • 5130 Harvard Avenue, Cleveland, Ohio

AIR-MAZE

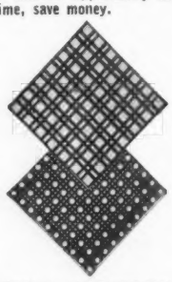
REGISTERS and GRILLES



No. 3320 REGISTER WITH INDIVIDUAL ADJUSTMENT OF GRILLE BARS—45° TO THE LEFT OR RIGHT.

Standard Stamping presents to the heating and air conditioning trade a striking new line of registers and grilles for gravity warm-air heating, air conditioning and ventilating systems. Modern in appearance and far better than average in performance, they offer the contractor an unusual opportunity to add the final touch to a good job, and at the same time, save money.

A complete catalog containing time saving charts and tables as well as the full line of "Standard Air-Control" registers and grilles is now available and will be sent on request. Write for your copy today!



PERFORATED METALS

Screens and grilles for many industrial purposes such as sorting, sifting, and light fancy panels. We have a complete line for almost any use.

WRITE for CATALOG!

STANDARD STAMPING & PERFORATING COMPANY
3131 W. 49th Place Chicago, Illinois

"must" item on which no compromises should be made.

These "must" items can best be covered by a "Code of Minimum Requirements" which should be enforced by the utility under penalty of withholding free service from installations not meeting these minimum requirements.

Such a Code of Minimum Requirements has been drafted by the New Jersey Gas Association and copies are available by addressing the Secretary, or the writer, at 80 Park Place, Newark, New Jersey.

Every utility and winter air conditioning manufacturer should obtain a copy of the Gasco Installation Guide for inspection. When such a set of standards has been universally adopted there need be no fear about the future of gas winter air conditioning.

◆

With the Manufacturers . .

M. J. Sandling

Aubrey Flood, president of Howell Electric Motors Company, Howell, Michigan, recently announced the appointment of Milton J. Sandling as vice-president in charge of sales.

◆

Harry S. Hoag

Harry S. Hoag, 154 Maple Street, Springfield, Mass., has recently been appointed Eastern representative of the J. L. Skuttle Company, Detroit, manufacturers of automatic humidifiers.

◆

Niagara Sales Meeting

Pictured here is the Niagara sales representative group that gathered at the Hotel Cleveland, Cleveland, Ohio, on February 23rd and 24th to see a preview of Niagara's improved line of furnaces for 1939 (manufactured by Forest City Foundries Company) and hear Niagara's sales plan for the year. Notable among the changes in the Niagara line

are the improvements in the series 20 gravity and winter air conditioning gas fired units which now have re-designed cabinets and are available with a variety of automatic two-speed blower equipment.

The Niagara line includes gas, coal, and oil fired cast iron gravity and winter air conditioning units and coal and oil fired steel furnaces and winter air conditioning units. An oil burner has also been added to the line of Niagara heating equipment.

◆

Mueller Sales Conference

L. J. Mueller Furnace Company, Milwaukee, Wisconsin, entertained Branch Managers and Sales Representatives at the 30th Annual Sales Conference held at the Astor Hotel, Milwaukee, recently.

One of the high spots of the Conference was the announcement of a new stoker-fired furnace with anti-fly ash feature . . . a floor furnace of new and exclusive design . . . and a complete line of pre-fabricated duct and fittings.

The Exclusive Metaphram Principle Makes Them

DEPENDABLE and DURABLE

MH

THE *Symbol* OF THE NEW AUTOMATIC HEATING

METAPHRAM* REGULATORS

for LOW COST FURNACE CONTROL

METAPHRAM combustion regulators are self contained. The unusual and exclusive design of the individual sectional diaphragm, or Metaphram, which is made of the highest quality admiralty brass is responsible for their power and durability. Sensitive elements in all Metaphram Regulators may be easily replaced in case of damage.

METAPHRAM WARM AIR FURNACE REGULATORS

OPERATE draft and check dampers so as to maintain balance between casing and return air temperatures. Provides safety by preventing excessive furnace temperatures, economy and comfort through elimination of overheating and underheating and labor saving by reducing number of firing periods.

METAPHRAM TANK HEATER REGULATORS

PROVIDE continuous, abundant supply of domestic hot water from coal fired tank heaters. Available in two types, immersion and surface. Mounted on vertical or horizontal pipe line, or on storage tank. Easily installed without draining water system. The lever arm of the surface type regulator is marked so that it may be adjusted for any desired water temperature.

Minneapolis-Honeywell Regulator Co., 2726 4th Ave. S., Minneapolis

MINNEAPOLIS-HONEYWELL

* Trade Mark

Metaphram Regulators

MONCRIEF

MAKES QUICKER EASIER MONEY FOR YOU

It's easy to please any customer when you can supply him with just the type and size of Moncrief furnace or air conditioner he really needs.

It's easy to sell him because every Moncrief unit is quality built, superbly styled, and includes every desired improvement.

Moncrief units are easy to install. The sections of the Series "C" cast furnaces are ground, fitted, assembled and shipped as a unit. Moncrief winter air conditioners are easy to erect and easy to get into after installation.

In every way you will profit most with the complete Moncrief line. Send for catalogs and prices.

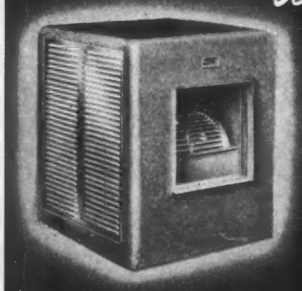
THE HENRY FURNACE & FOUNDRY CO.

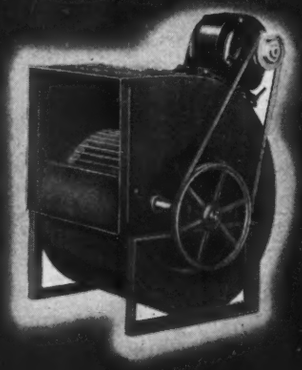
3473 E. 49th STREET, CLEVELAND, OHIO

Manufacturer of

- Cast and Steel Furnaces
- Winter Air Conditioners for Gas, Oil and Coal
- Pipe, Fittings and Accessories
- Moncrief Blower-Filter Units
- Moncrief Automatic Humidifiers

For Summer Profit...
Modern Evaporative Cooling
with
UTILITY
DEZERT & KOOLERS



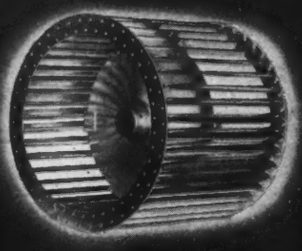


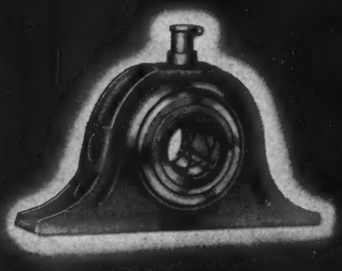
9 MODELS

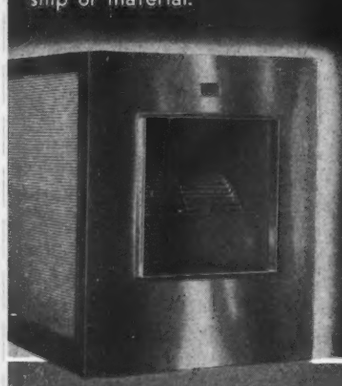
- 1,000 to 10,000 C.F.M. Including the new Inside Room Cooler.

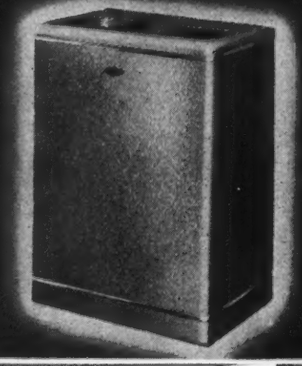
DEZERT KOOLER FEATURES INCLUDE

- Utility dynamically balanced centrifugal blowers.
- Forward curve multiple vane blower wheels—greater output at slower rotative speeds.
- Randall graphite pillow blocks
- "No-Sag" cooling and filter pads—cannot slip or settle.
- Rust-resisting steel cabinet and lead-clad water reservoir.
- Baked enamel finish—metal trim.
- Self contained water recirculating system with self-controlled motor—standard on Inside Room Cooler—optional on Dezert Koolers at small additional cost.
- A full year's guarantee against defective workmanship or material.









MOST COMPLETE
E OF EVAPORATIVE
OLERS and BLOWERS
Write for
PLETE CATALOGS

UTILITY FAN CORPORATION
2528 Sante Fe Ave., Los Angeles, Calif.
Please send me information on your
☐ Dezert Koolers ☐ Blowers
☐ Blower Wheels ☐ Pillow Blocks
Name
Street
City State

Michigan Convention

(*Continued from page* 58)

the 1-in. rake joint in the wall and a 4-in. cap. With the advent of thru-wall flashing, this same building would carry over 1,000 square feet of sheet metal as thru-wall flashings on the parapets alone. Architects and engineers are now detailing thru-wall flashing at window heads and sills, belt courses, rising walls, spandrel beams, setbacks, and even foundation courses in order to protect permanently against wall seepage. Present day construction demands this type of protection. Changes in materials and workmanship have caused this.

The speaker called attention to an article written by one of the country's foremost construction engineers and which appeared in the December issue of *Engineering News Record,* entitled "How to Build Leaky Walls With Good Materials." The article supplies full information as to the method by which any careless or unscrupulous builder can produce a poor wall with a definite high maintenance cost, irrespective of how excellent the materials used might be. Other instructions are given as to how to evade the inspectors and excuses to give them should such work be questioned. This type of construction has caused the Government in all of its departments to specify on all Federal work thru-wall flashing at all copings, rooflines, window heads, sills, etc., to insure against such enormous maintenance costs. The FHA has now issued bulletins to all architects drawing plans upon housing projects for apartment houses carrying FHA loans, that these plans must include wall gaskets.

Key Bond and Drainage Channel

Mr. Davis said that it has been proved that the mechanically keyed thru-wall flashing beyond a doubt supplies a definite mechanical key bond in the mortar bed and supplies drainage channels through which the moisture is carried out of the wall. This is the sheet metal contractor's work. It is furnished and installed by the sheet metal contractor only. While thru-wall flashing is comparatively new, it has proven itself and has been accepted and specified by the leading architects. Having proven itself by tests and application and performance, it has been accepted whole-heartedly and has led us to additional usage and application.

While some architects still think of thru-wall flashings for parapets only, other architects have proven its satisfaction and efficiency and are anxious to use it at other vulnerable spots in present day construction. For instance, spandrel beam protection.

Increases Sheet Metal Contract

Mr. Davis called attention to the revolutionary system for spandrel beam water-proofing incorporating the use of sheet copper, devised by The Cheney Company. This system must be installed by the sheet metal contractor as part and parcel of his contract. Returning to the previous example—a building having a 400-foot perimeter—old time methods allow for 175 square feet of metal. Thru-wall flashings increase this to over 1,000 square feet. Now suppose the building were 6 stories high. The sheet metal requirements for flashing and spandrel beam water-proofing will now be increased

LACLEDE

FURNACE CEMENT

FOR MOUNTING & SETTING

FURNACES
STOVES
HEATERS
- ETC. -

DRIES FASTER
SETS STRONGER
LASTS LONGER

Prove our Claims
Ask for Free Sample

LACLEDE-CHRISTY

411 N. SEVENTH ST.
ST. LOUIS, MO.

"Competition Can't Beat Me When I Can Beat Them Up to 50% on Duct Work Costs—"

All sizes — illustrated, the No. 22-A Machine for 22 to 28 gauge, inclusive. Larger machine for 18 gauge and lighter.

Using my BINKLEY KOR-NER-LOK FORMER

YOU, too, can go out and bid—figure your duct work costs about half less than competition that doesn't have a Binkley Kor-Ner-Lok Forming Machine in the shop to reduce costs. This sturdy, 600 pound machine turns out corner and Pittsburg locks—forms up five 8-foot sheets a minute—neatly, uniformly and easily. Get this money-saver—be ready for the rush season.

Write for Details

BINKLEY MANUFACTURING CO.
WARRENTON MISSOURI

PLAN on INCREASED SALES and PROVEN PROFITS with *Pacific...*

THE GAS HEATING APPLIANCE COMPANY BACKED by the EXPERIENCE and REPUTATION of a QUARTER CENTURY

☆ This year gas heating equipment sales will reach new heights and Pacific is again in the lead with new models and the only complete line of heating units in the West. There is an installation for every purse and purpose and more people are demanding Pacific Gas Heating Appliances. Nothing quite equals Pacific equipment for efficiency, economy and trouble-proof operation.

☆ You make more sales with Pacific's sales-compelling features and reputation for performance.

☆ You create good-will by installing Pacific's trouble-proof units.

☆ You make bigger profits with Pacific's liberal dealer plan.

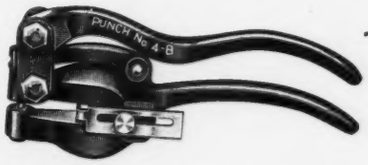
☆ Join up with Pacific and get your share of this year's business.

☆ Architects specify . . . owners demand . . . Pacific.

Don't Delay... Write Today!

Pacific
GAS RADIATOR COMPANY 1740 W. WASHINGTON BLVD. LOS ANGELES, CALIFORNIA

WHITNEY
LEVER PUNCHES



NUMBER FOUR "B" PUNCH

This punch for sheet metal work has a capacity of ¼" through 16 gauge. Weight 3 lb. Length 8½". Depth of throat 2". Complete tool includes three punches and three dies of specified sizes with die adjusting key. A time-saver for your up-to-date shop.

And here's another handy tool for the modern shop—the No. 2 Punch. Length 23". Capacity 5/16" through ¼" iron, weight 12 lbs., depth of throat 1 11/16". Punches and dies 3/32" to ½" by 1/64".

NUMBER TWO PUNCH

W.A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL.

EXTRA PROFIT *with* . . .

RELIANCE TIME SWITCHES *for* ATTIC FANS

There's "gold in them thar attics" for smart dealers who tie up attic fan sales with Reliance Automatic Time Switches! ! Attic ventilation has become a very important part of the air conditioning picture . . . and you can make it pay you EXTRA PROFITS by selling a Reliance Time Switch with EVERY fan.

Show the customer how the switch will enable him to forget the fan from the time he starts it for the summer until he shuts it off. And most important, it'll soon pay for itself by saving hours of unnecessary operation. There's a real chance to make some extra money in seasons to come. Write us today for further information and descriptive literature.

RELIANCE AUTOMATIC LIGHTING CO.
1929 Mead St. Racine, Wisconsin

"HAVE CLARAGE MAKE THEM"

Every year we ship to furnace manufacturers and to builders of unit air conditioners thousands upon thousands of Clarage Blower Wheels and Assemblies. These smaller units were designed with the same skill characteristic of the larger Clarage equipment — just as carefully constructed — just as carefully tested. And we have sizes to meet ALL REQUIREMENTS — with slow speed operation insuring SILENT PERFORMANCE. May we have your next inquiry?

SPECIFY CLARAGE for COMPLETE AIR CONDITIONING · VENTILATION · HEATING · COOLING · MECHANICAL DRAFT · FANS & BLOWERS FOR INDUSTRIAL NEEDS

CLARAGE FAN COMPANY • Kalamazoo, Mich.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

to 4,000 square feet of metal plus the Reglet and plus the sheet metal cap fabricated by the sheet metal man in his own shop. So, instead of a $50 contract, the sheet metal contractor has a $2,500 contract plus his overhead and profit.

Compared to membrane, Mr. Davis said the sheet metal work for complete installation would be cheaper. He said on several recent jobs the architects have asked for alternates, using this system in lieu of the membrane water-proofing, and in each case the sheet metal contractor has been awarded the work. He said the Government is now specifying this system throughout their departments. Several jobs now under construction, he said, have had addendums issued by the Government and these addendums have been accepted and the Cheney Reglet System is going in.

Cheney flashing and Cheney Flashing Reglet, Mr. Davis assured, are sold only to sheet metal contractors. The manufacturers insist to the architects and engineers that this material is to be included in the sheet metal contracts.

Sales and Use Tax

Mr. Krebsbach of the Michigan State Board of Tax Administration, Lansing, explained the "Sales Tax and Use Tax."

In 1937, there was a change in the law, and the present ruling is expected to stick. The supply dealer pays a tax on all sales to the contractor, except where the contractor can prove the material is tax exempt.

"Unemployment Insurance" as applied in the State of Michigan, was discussed by A. Zwerdling, Jackson Representative of the Michigan Unemployment Compensation Commission.

The annual meeting of the Traveling Salesman's Auxiliary to the Michigan Sheet Metal and Roofing Contractors Association was held during this convention with the following Auxiliary officers elected:

President—Johnny Pine, Detroit
Vice President—D. H. Ruh, Detroit
Secretary-Treasurer—John E. Behler, Grand Rapids
Sergeant-at-Arms—Ernie Overbeck, Detroit

The annual banquet on Thursday at 6:30 p. m. was given by the Travelers Auxiliary.

◆

Attic Ventilation In Houston, Tex.

(*Continued from page 77*)

$280 for a 60-inch fan. Installation costs vary according to the mechanical problems presented.

A recapitulation of the sales methods used, indicates that the Houston district employs the following publicity media: newspaper space; envelope stuffers; radio; booklets, fairs and conventions, door to door canvassing, and window displays (in which 5 or 6 models of varying sizes and prices are shown).

Another feature aiding the sale of attic ventilation in Houston is the fact that F. H. A. officials and other governmental agencies are very favorable to the idea.

So well has the preliminary training of the electric utility succeeded, that no fires traceable to attic ventilation have occurred here, and wide experience has demonstrated that this type of air conditioning offers practically no fire hazard, when properly installed.

CAN YOU SELL

An AIR CONDITIONING PLANT to the builder of SMALL HOMES?

Make a profit and give the buyer of that small home the break he expects and rightly deserves?

Our Dealers are doing just that and by the hundreds.

Warehouse Stocks in large centers are carried for the convenience of the Production Builder.

The Builders and the buyers of 1000 Homes will vouch for the quality of our product and its efficient operation.

•

CALESCO CORP.
LYNN MASS.

GALVANIZED
LOCK-SEAM PIPE

THE PIPE WITH THE BIG STRONG SEAM

Widely used for Air Conveying, Dust Collecting and Irrigating Systems, Smoke Stacks, Exhaust Systems, etc. 10 ft. lengths furnished in sizes from 3" in diameter and larger—14 gauge and lighter.

★ NEW PROCESS ★
ROLLED STEEL ANGLE **FLANGES**

LARGE STOCK FOR QUICK DELIVERY IN STANDARD SIZES FROM 6" TO 36"

Larger sizes rolled when desired. Also special angles, tees, channels, bars and rods rolled in any direction, to any radius or part of a circle. On the first job you'll see the difference. These flanges are accurate in every dimension, uniform in curvature, free from distortion, and have a perfectly smooth surface that insures a tight joint. Write TODAY for list of stock sizes and discount sheet.

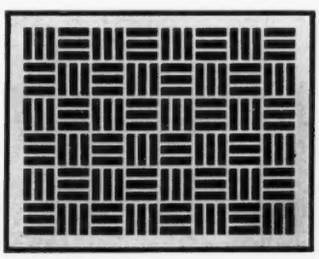
CHICAGO METAL MFG. CO.
3720 S. ROCKWELL ST., CHICAGO, ILL.

PERFORATED METALS

Architectural Grilles

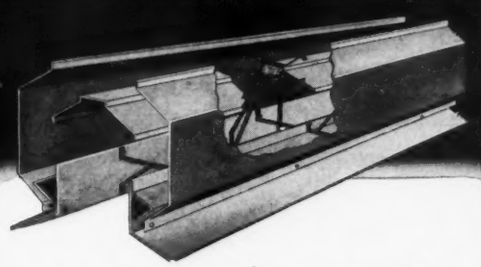
Grilles of distinction for fine buildings in a wide variety of designs, including standard and many original patterns. Write for information!

Our product includes perforated metal for all industrial and ornamental uses in all kinds of metal.



The Harrington & King PERFORATING CO.
5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

BURT Monovent
Continuous Ridge VENTILATOR



The Easier Way to Profits

You can sell Monovent easier because it gives as efficient ventilation as unit roof ventilators at one-third less cost. It presents a better appearance and it is no job at all to install on any type of roof. Burt makes a size and a type of roof ventilator for every purpose. Call on Burt Engineers to help you plan and estimate any kind of roof ventilator job. Write for catalog and prices.

THE BURT MFG. CO.
Roof Ventilators • Oil Filters • Exhaust Heads

301 MAIN STREET AKRON, OHIO

"FURNACE MAN HOST AT GOLF CLUB"

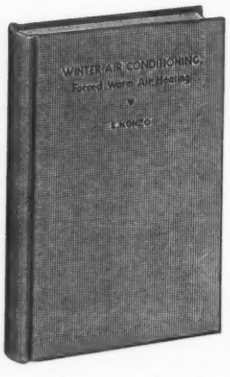
Gentlemen:
You will recall last year I sold a TRIPL-IFE heating plant to our Country Club here. Since then I have been persuaded, much to my wife's amazement, to join and take up golf.
Next Thursday I am host at a party at the Country Club and all the members who can do so will come.
I would like very much if you and Mr..... could drive up Thursday afternoon and be my guests at this party. This would give us a chance to celebrate the early spring furnace business I have been able to sell. Let me know if you can come.
Sincerely yours,
XYZ....., Ohio.

Complete information; name, address of writer of above letter furnished on request. Phone, wire or write The Williamson Heater Company or nearest jobber. Representative will call within 24 hours.

FREE: Complete, easily understood short method for figuring air conditioning jobs. You can complete your figures, price job in one hour flat. Write Dept. 2.

THE WILLIAMSON HEATER CO.
CINCINNATI, OHIO
TRIPL-IFE Complete Line Quick Service FLO-WARM
You can triple your profits with "Tripl-ife"

A NEW BOOK EVERY HEATING MAN SHOULD OWN



WINTER AIR CONDITIONING
Forced Warm Air Heating
532 Pages—6"x9"—Cloth Bound—$3.00
by S. KONZO
Research Assistant Professor University of Illinois

Embodied in this 532 page volume is the complete record and explanation of the results of the forced air heating studies carried out in the Research Residence at the University of Ilinois. It is filled with basic information that heating men everywhere will find invaluable as a guide to correct and up-to-date practice in the design and installation of forced air heating and residential air conditioning systems. WINTER AIR CONDITIONING belongs in the hands of everyone interested in or doing residential air conditioning work. As this book has been published by the National Warm Air Heating and Air Conditioning Association to make its invaluable data readily available to all it is offered to the industry at the low non-profit price of only $3.00 per copy. To obtain this book promptly, send your order and remittance today to the address below.

KEENEY PUBLISHING COMPANY
6 N. Michigan Ave. Chicago, Illinois

Konzo, Calculating Cooling Load

(*Continued from page* 64)

approximately 10 to 30 cu. ft. per min. depending upon the type of occupant and the crowding of the occupants. Furthermore, the presence of tobacco odors and cooking odors will require the introduction of air quantities appreciably greater than these minimum values. Some judgment of the air requirements for the installation under consideration will, of course, be necessary. The quantity, Q, which is in terms of cu. ft. of air per hour, may be established from the equation:

$$Q = (\text{No. of occupants})\ (\text{Allowable c.f.m. per occupant}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6a)$$

The heat brought in by ventilation air can then be determined from the equation:

$$H = Q\ (0.24)\ (\text{density})\ (i_o - i_1) \quad \ldots\ldots\ldots (7)$$

in which, Q = Cubic feet per hour.
density = density of outdoor air. This is equal to approximately 0.071 for 95 deg. F. air.
i_o = Enthalpy of outdoor air, B.t.u. per lb. (See fourth column in Table 2)
i_1 = Enthalpy of indoor air, B.t.u. per lb. (See last column in Table 1)

Example.

Given 500 c.f.m. of air brought in for ventilation. Then Q = (500) (60) = 30,000 cu. ft. per hr.

Outdoor design dry-bulb temperature = 95 deg. F., wet-bulb temperature = 75 deg. F. Then i_o from Table 2 = 38.46 B.t.u. per lb.

Indoor design dry-bulb temperature = 78 deg. F., wet-bulb temperature = 65.3 deg. F. Then i_1 from section entitled "Indoor Design Temperature and Humidity" = 30.19 B.t.u. per lb.

See also the values given in the last column of Table 1.

Solution.

$$H = (30{,}000)\ (0.24)\ (0.071)\ (38.46 - 30.19) = 4228 \text{ B.t.u. per hr.}$$

Item 8. Heat Given Off by Occupants.

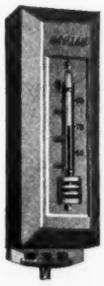
"The work of F. C. Houghten and others indicates that the heat loss from a sedentary individual is approximately 400 B.t.u. per hr." Hence, the hourly heat gain for persons seated and at rest will be:

$$H = (\text{Number of persons})\ (400) \quad \ldots\ldots\ldots (8)$$

The heat loss from an individual increases as the muscular activity of the individual increases, as is shown by a few examples:

Office worker, moderately active	= 490 B.t.u. per hr.
Clerk, standing, moderately active	= 600 B.t.u. per hr.
Walking, 2 mi. per hr.	= 761 B.t.u. per hr.
Walking, 4 mi. per hr.	= 1390 B.t.u. per hr.
Very severe exercise	= 2560 B.t.u. per hr.

TESTED AND PROVEN



No Master product is ever made available until it has been thoroughly tested and proven to be worthy to bear the Master name. The model B-22 has proven its dependability not only in our exhaustive tests, but in use under actual operating conditions in the many years it has been sold and installed all over the country.

TYPE B-22

A two position heat regulator that is ideal for the small home. It is sturdily made and dependability and precision are built right into it. A noiseless device that will outlast the heating plant.

Made by the makers of the famous Type B-144, the original gradual control heat regulator.

WHITE MFG. CO.
2362 University Ave. St. Paul, Minn.

MASTER
TEMPERATURE CONTROLS

BENDING BRAKES **WHITNEY-JENSEN** METAL TOOLS

SUPER-EDGER

HAMMER TYPE SELF-STARTING FLANGING MACHINE

Turns an edge by hammer-blow *flowing* action instead of crimping . . . gives new smoothness and accuracy . . . no hand crimp necessary for starting . . . just place the edge under the anvil and let 'er go! Capacity . . . any 90° flange up to ⅝" deep . . . any metal up to 18 gauge . . . practically any shape.

DUPLEX ROLLING MACHINE

Embodying proven rolling principles in use for 16 years . . . now improved and perfected by experienced sheet metal tool engineers . . . for maximum service, accuracy, and long life.

25 YEARS TRADE W MARK SHEET METAL TOOLS

The Machine with the
GREATER VALUE Features

TWO sets of rolls . . . reliable 18 ga. capacity . . . speed of 38 ft. per minute . . . accurate individual roll adjustment . . . double ball bearings . . . improved gear drive . . . calibrated depth gauges . . . quick-change rolls . . . extra weight, strength, and ruggedness.

WHITNEY METAL TOOL CO. • 97 Forbes Street, Rockford, Illinois

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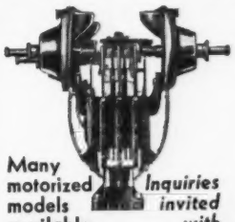
BE SURE TO SPECIFY
The Best Rivets You Can Buy



Many motorized models available in single stroke and multiple drive

Inquiries invited with samples of work you wish to do

The word BEST is applied to T R & S rivets and automatic setting machines as recognition of adherence to the manufacture of a quality product as close to perfection as skill, inspection and processes of manufacture can produce—100% usable, accurately gauged rivets made by the world's oldest and largest Tubular and Split Rivet factory.

TUBULAR RIVET & STUD CO.
World's Foremost Producers of Rivets
WOLLASTON MASSACHUSETTS

METALBESTOS
NON-CORROSIVE SAFE EFFICIENT

GAS VENT & FLUE PIPE

FULLY COVERED BY PATENTS

APPROVED BY UNDERWRITERS' LABORATORIES, INC.,

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DON'T BE MISLED!!!

Solid wall types of pipe can not and do not perform satisfactorily as gas vents and flues. The heavy cold walls chill the burnt gases so that they condense and do not travel with sufficient velocity to insure proper draft.

METALBESTOS — "THE ULTIMATE PIPE" —is constructed to meet all requirements of a perfect gas vent and flue pipe. Send for fully descriptive catalog telling why.

WILLIAMS-WALLACE CO.
160 Hooper Street
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We are interested in your METALBESTOS GAS VENT and FLUE PIPE. Send along your catalog and price list!

NAME .....

STREET ADDRESS .....

CITY and STATE.....

As you turn this to read, so will the public turn to look at your SWIFT Cleaner.

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Here's just the thing to get your name out in front of your competition and keep it there. Does a thorough cleaning job in the least possible time. Write today for further particulars.

IT SELLS WHILE IT CLEANS

CARL E. SWIFT
Holland, Michigan

WATER BOY SAFETY FEEDER

The No. 59F combination consists of a Midget float-controlled Water Feeder, 6 ft. of 1/4" O.D. Copper supply pipe, No. 8 Saddle Valve, 2 ft. of 5/16" Copper Tubing, and Fittings to connect feeder to humidifier. Water Feeder is housed in an enameled reservoir, 6"x2½"x2½", with cover and thumb screw for adjusting height of the water line.

SEND FOR FREE CATALOG A-4

MAID-O'-MIST, Inc.
180 N. Wacker Drive, Chicago, Ill.

NU-DRY
FURNACE CEMENT
"BEST BY TEST"

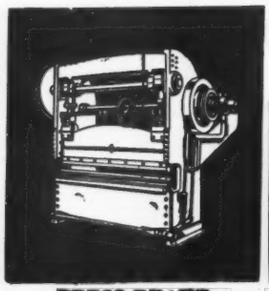
Nu-Dry Furnace Cement when mixed with water is ready for use and when applied makes a soft Gasket between the Castings. Will not crack, powder, or bloat with the expansion and contraction of the Castings when they are heated and cooled.

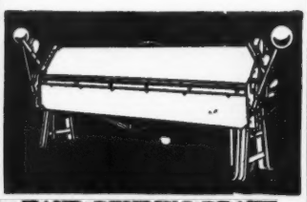
It comes to you dry—takes less material to set a furnace—FURNACE CAN BE FIRED IMMEDIATELY AFTER CEMENT IS INSTALLED—will not shrink—keeps joints tight at all times—eliminates material losses for it does not harden in containers.

Send for complete information.

THE PYROLITE PRODUCTS CO.
CLEVELAND, OHIO

CHICAGO





PRESS BRAKE **HAND BENDING BRAKE**

Steel Brakes—Presses—Shears

DREIS & KRUMP MFG. CO.
7404 LOOMIS BLVD. **CHICAGO**

A complete tabulation of various forms of activity and the heat loss resulting from each is given in the A.S.H.V.E. Guide.

Item 9. Heat Given Off by Electric Lights.

$$H = \text{Watts } (3.415) \quad \ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Item 10. Heat Given Off by Electric Motors.

If the motor is located in the room, then the entire electrical input is considered as being converted to heat and

$$H = \frac{(\text{Horse power rating})\ (746)\ (3.415)\ (100)}{\text{Motor efficiency in per cent}} \quad \ldots\ldots\ldots\ldots\ldots\ldots (10)$$

Item 11. Other Heat Producing Appliances.

In the case of restaurants where gas-burning or steam-heating devices are used, the heat given off from appliances should also be considered in the heat gain calculations. Specific data on such devices may be obtained from the A.S.H.V.E. Guide and other sources.

Refrigeration Tonnage Required

The calculations listed in the preceding eleven items composing the sources of heat gain are usually made for each room, or space, as in the case of winter heat loss calculations. The sum of the hourly heat gains

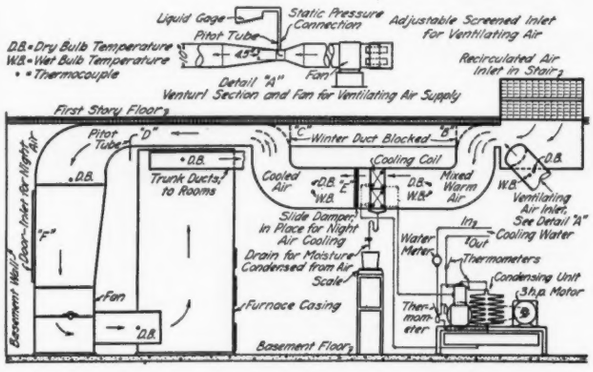


Fig. 5—Diagram of cooling plant with mechanical refrigeration in the Research Residence.

from all of the rooms in the structure is the total hourly heat of the structure. Since the capacity ratings of refrigeration equipment (Fig. 5) are stated in terms of "ton of refrigeration," which is equivalent to 12,000 B.t.u. per hr., the net refrigeration requirements will be equal to:

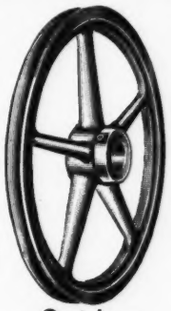
$$\frac{\text{Total hourly heat gain}}{12{,}000} = \text{Net Tons of Refrigeration}$$

In large installations, an additional refrigeration capacity must be provided to take care of the heat gain by the cooling coils and air distribution ducts. In small compact installations in which the cooling coils are well insulated, this additional capacity is frequently neglected.

In the next issue a further discussion will be presented of the calculation of the air requirements for cooled spaces. Many items of interest concerning the cooling load will also be considered in detail.

MAUREY V-PULLEYS Serve Best Where DEPENDABILITY Counts Most

THE New MAUREY Cast Iron V-Pulley will be found particularly efficient when used with Blowers and Air Conditioning Equipment. Tests prove that its new scientific design—five specially shaped spokes—give less resistance to the flow of air in these installations than the ordinary pulley. It is exceptionally sturdy, well balanced and true running. Available in seven sizes—7.2" to 14.2" O. D.



Cast Iron

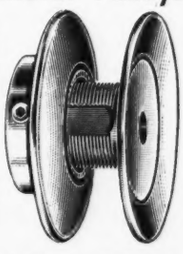
MAUREY Steel V-Pulleys are well known for their trouble-free service with F. H. P. installations in Stokers, Fans, Air Conditioning and Refrigeration Units.

Made of STEEL with heavy rolled edges giving extra sturdiness. Hubs are machined steel or malleable iron, not die cast. Carried in stock in a wide variety of sizes for both "A" and "B" belts.

WRITE FOR CIRCULARS GIVING PRICES AND DESCRIPTIONS.

MAUREY Variable Pitch Diameter Pulleys

Solid steel construction. Adjustment permits speed variation of as much as 30%. Fine, accurate, milled threads, 20 to the inch, assure close adjustment. Designed for Air Conditioning Units. Solid steel—not die cast. Made in 4 sizes, 3¼" to 4½ inches in diameter.



MAUREY MANUFACTURING CORP.
Wabash at 29th, Chicago, Illinois

BIGGER AND BETTER

NEW IMPROVED MODELS

PREMIER FURNACE CLEANERS

Completely Equipped

⅝ Horsepower **69.50**

1 Horsepower **89.50**

Premier's your best buy—whether you're interested in service or profit-making! Bigger bags with larger filtering area and larger, more durable hose mean greater efficiency and longer wear. The motor can be used independently for suction and blowing in cleaning air ducts, registers, grills, radiators, filters, and air-conditioning equipment.

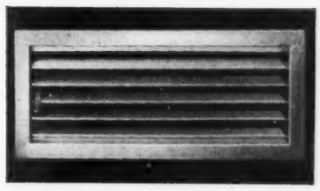
Motor specifications—Model 174, ⅝ horsepower, maximum vacuum, 35 inches in water—Model 175, 1 horsepower, maximum vacuum, 46 inches in water.

Business-getting return postcards furnished to dealers at low cost. Write for complete details today.

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Road • Cleveland, Ohio

WATERLOO REGISTERS

Bring Home The PROFITS



DEALERS who handle the complete Waterloo line are well equipped to get a big share of this year's register business. Such features as Matched Design, adjustable direction control, Venetian type design, and many others, are winning the approval of register buyers everywhere.

FREE catalog containing illustrations, charts, installation data, etc. sent on request. Write for your copy today.

Waterloo Register Company
WATERLOO, IOWA SEATTLE, WASH.

QUALITY EQUIPMENT-- FROM HESS-- COSTS LESS

BENEFACTOR FURNACE

Gives far superior value in a high quality welded steel furnace, at low price. It's rectangular throughout, has 2½" thick brick fire box lining. Highly efficient with any fuel or automatic burner.

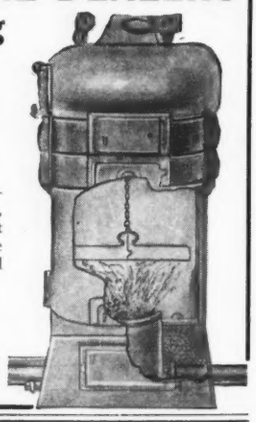
THE HESS LINE IS COMPLETE
FOR EVERY DEALER REQUIREMENT

It includes, Hess Welded Steel Furnaces up to one million B.T.U. capacity Blower Filter Units, oil burners, coal stokers. Exclusive territory protection, free plan service, F.H.A. terms, free consumer literature assure increased dealer sales and profit.

WRITE FOR DEALER PORTFOLIO
HESS WARMING & VENTILATING CO.
1211-27 S. WESTERN AVE. Founded 1873
CHICAGO, ILLINOIS

STOKER and COAL DEALERS PROFIT by Using
REFRACTORY
BAFFLE PLATES
for
Domestic Stoker Installations

You can be assured of customer satisfaction with our Refractory Baffle Plates, which are specially designed to deflect the flames for greater contact with the heating surfaces. They insure satisfied customers.



Write for Bulletin 395 and price list.

McLEOD & HENRY CO., Inc.
TROY, N. Y.

JOHNSON No. 101 BENCH FURNACE
Cuts Soldering and Heat-treating Costs!

Superior work and lower production cost result from efficient design and low fuel consumption. All types of gas burned clean at intense heat *without blower or forced air-blast*, by two Patented Johnson Direct Jet Bunsen burners. Handles soldering coppers up to 12 lbs. per pair. Refractory lining, ideal for heat-treating carbon steel tools and small gears and parts. Dependable shut off valves and pilot. Many features for speed and good work. Ruggedly built for long service. Send for free catalog now.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

CHECK YOUR AIR-CONDITIONING INSTALLATIONS
WITH THE
"ALNOR" VELOMETER

This all-purpose air velocity meter indicates air velocities directly and instantaneously on the scale in f.p.m. without the necessity of timing or mathematical calculations. Standard range 0-300, 0-3000 f.p.m. Other ranges available up to 18,000 f.p.m.

Write us today for a folder giving more complete information.

ILLINOIS TESTING LABORATORIES, INC.
412 N. LaSalle Street **Chicago, Illinois**

Make SUMMER PROFITS With the New PEERLESS LINE

Make yours a "year-around" business with these new economically-priced units which are equipped for simplified night-cooling, as well as forced air heating in winter. PEERLESS has every type of furnace, from conventional round style steel and cast iron units at sensationally low prices, to completely automatic air conditioners in modern streamline cabinets, with blowers, filters, humidifiers and controls. Write today for literature on all of these models, prices, discounts, etc. PEERLESS prices and extra conveniences will make sales and profits for you. Parts for all makes of furnaces carried in stock for prompt shipment.

PEERLESS FOUNDRY CO., 1853 Ludlow Ave., Indianapolis, Ind.

New York Convention

(*Continued from page* 85)

Ray Mowers, Division of Placement and Unemployment Insurance, for New York State, speaking on "Unemployment Insurance," explained that New York State has a pooled fund plan because the state believes this is the most effective protection at the lowest cost and is most reasonably allocated. Mr. Mowers said that based upon experience, New York State, under the direction of the Federal government, has set up a state employment agency where the employee out of work must register, in the hope that the employer needing a man and the employee needing a job can be brought together.

Group Insurance

John Forrest, speaking for Thomas G. Gorman, on "Group Compensation," outlined a group plan which is in force in New York State, whereunder any one group of contractors doing a similar line of work may apply for group insurance, providing the premiums paid total $50,000 annually. Under the New York plan, contractors entering the group fund immediately receive a fifteen per cent reduction on premium cost with possible further yearly dividends providing the group insurance does not meet with unusual expenditures. In New York State, some groups have received as much as 70 per cent annually in dividends.

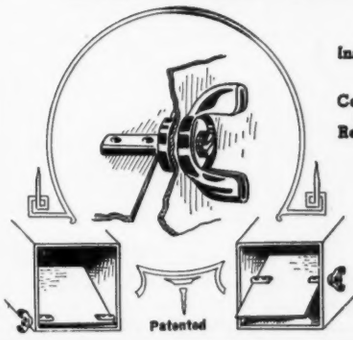
The New York State Association has been working for the past year trying to organize a group to apply under this group plan and at the meeting, the list of members was voted to be turned over to the state insurance fund so that the state organization could solicit contractors.

Manufacturers contributed funds for an "open house" during the meeting; the California Redwood Association showed a moving picture "California Giants," in which the complete lumbering operations from virgin timber to insulation material was shown in technicolor; Republic Steel Corporation showed their moving picture "Stainless Steel, an Extra Profit for the Sheet Metal Shop," and a banquet was held on the last night of the meeting.

N. Y. State Licensing Bill

The association went on record as opposed to the Condon bill now before the New York State legislature. This is a bill requiring the licensing of contractors engaged in the construction, installation, alteration, maintenance and repair of air conditioning systems, with a state board and local boards, with power to administer the rules and regulations, the state board to consist of five members appointed by the Governor —one to be a sheet metal worker, one a sheet metal employer, one a steamfitter, one a steam fitter employer, and one a mechanical engineer. This is practically the same bill which was presented at the New York legislature last session and was defeated. The association requested all warm air heating contractors to oppose this bill on the basis that the warm air heating industry is not represented.

THE GOESE TIME SAVER DAMPER CONTROL



Positive—Simplified

•

Less Labor to Install Insures Tight Vibration-less Job

•

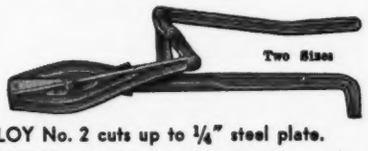
Can be Used on either Flat, Square or Round Pipes Regular or Splitter Dampers

•

Screw Slot on Threaded Stud Shows Position of Damper. Bearings—Rust Proof Metal. Wing Nuts—Cadmium finished. Ask your Jobber.

Goese Mfg. Co.
2548 N. 18th Street
Milwaukee, Wis.

PORTABLE SHEARS
ALL-ALLOY



ALL-ALLOY No. 2 cuts up to ¼" steel plate.
ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.
Special blades may be had for shearing stainless steel.

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WITH
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The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

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Write now for complete information.

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. . . at No Extra Cost

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. . . perform so dependably season after season, your customer good will mounts high. That leads to other sales and profits for you.

Send for Full Particulars

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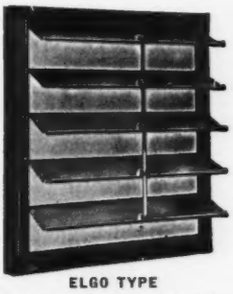
18th and Main Streets • CEDAR FALLS, IOWA



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Get our prices on Automatic Shutters, Stationary Shutters, Hand Operated Shutters, Ceiling Dampers, Balanced and Back Draft Dampers.

Elgo Ventilating Specialties

A Shutter With Many Advantages

In the first place, its louvres are weather-stripped in such a way that they fit more snugly. Second, it has a swivel-joint with a hardened steel bushing that does not get loose and rattle. And, third, it is more sensitive than any other automatic shutter, and longer lasting. Sizes from 10" to 60" square—also rectangular.

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Free CATALOG

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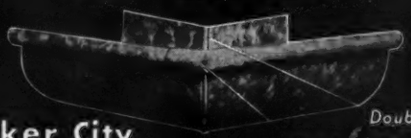

Quaker City Mitre

WRITE FOR "BB" CATALOGUE
Order from your jobber

Mitres, conductor pipe, hangers, eaves trough, caps, outlets, pipe hooks and fasteners

BERGER BROTHERS CO.
229-237 ARCH STREET, PHILADELPHIA, PA.

WARD
SHEET METAL WORKING MACHINERY

If it is a machine, tool or supply for the Sheet Metal Shop—We have it!

TRY WARD IN 1939

Your inquiries earnestly solicited.

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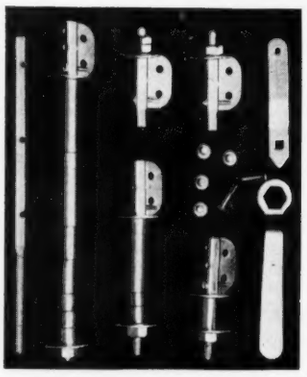
The New K-B Damper Control

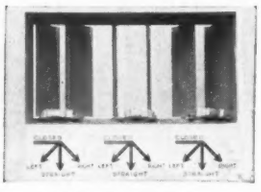


A foolproof, easily installed damper that will add efficiency to your installations.

Unique construction features separate rods and holders, allowing positive locking and close adjustment. Eliminates duct deforming.

Adjustable for any insulation or furring—always shows true position. ASK YOUR JOBBER—or write direct for particulars. Send 25c for working sample and direction sheet.

G. L. Kerentoff
2803 Jefferson Ave.,
Cincinnati, Ohio.



3 BATTERY TYPE

Compare this Register with any other type for both control and diffusion and the comparison will give you a SHOCK

Check the "BATTERY" type at once for Performance.

Register & Grille Mfg. Co., Inc.
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ACT NOW!

• Write today for complete information on the Skuttle line of automatic Humidifiers, and find out how you can profit with this fast selling line. Their trouble free operation and popular prices will interest you.

J. L. SKUTTLE CO.

999 FRANKLIN ST. DETROIT, MICH.

ACME "Hot Spot" WELDERS

Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.

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SPOTWELD!
with an ACME
Lifetime Guarantee!

Complete range of sizes

ACME ELECTRIC WELDER CO.
Distributors in principal cities
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Newly Modernized Rooms!

Everything planned for your comfort. Excellent food at moderate prices. You'll like the *"new"* Lenox.

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Special for 2 Rooms and Bath: 3 persons $6.00; 4 persons $7.00

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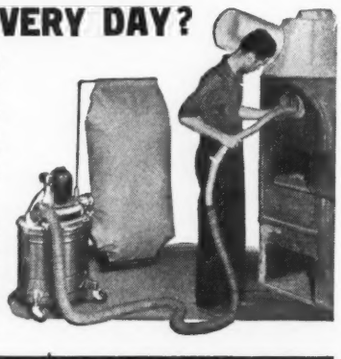
Heating men who use the Grand Rapids Furnace Cleaner and Plan get paid every day—they have money in their pockets every night at the close of business. Furnace cleaning is CASH and you don't have to wait for it. We show you how to get it. The DOYLE PLAN gets you going from a cold start.

Start earning the first day. PAY AS YOU EARN for Cleaner and Equipment. You have the privilege of inspection and trial. The Grand Rapids Furnace Cleaner is fast working, portable, efficient. You pay for it from extra profits. Write today. No obligation.



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Air Conditioning

—What happens between two rooms, one having a six minute air change, and the adjoining room a twelve minute air change?

—Can you install a thermostat control system properly?

The answers to these and hundreds of other mechanical questions about air conditioning are appearing in the monthly *Air Conditioning Section* of AMERICAN ARTISAN.

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AMERICAN ARTISAN
6 North Michigan Ave. Chicago, Ill.

Classified

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Wanted sheet aluminum worker capable of handling all details in the construction of large canopies or marquees. Must have best of references. Address W. J. Vierck and Son, 330 E. State St., Rockford, Ill.

SITUATIONS WANTED

Sheet Metal Worker, 39, Single. 25 years' experience in inside and outside work. Good layout man. Go anywhere. Address Key No. 461, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

FOR SALE

RADIATOR shop for sale. 20 years same place. Only one small competitor in city of 70,000 and five rural towns. Shop equipped for 2 repairers. Paved driveway, parking place, 5 car garage. Modern residence adjoining. Owner retires, will sell Goodwill or entire property. Address J. Hagler, 102 E. Howard, Pontiac, Michigan.

The best equipped Sheet Metal Shop in Central Ohio with best class of work between Pittsburgh, Pa. and Columbus, Ohio in a town of 15,000 people. A manufacturing center. Ill health reason for selling. Address Key No. 460, American Artisan, 6 N. Michigan Avenue, Chicago, Ill.

The American Artisan Service Section presents a golden opportunity to contact a national circulation at comparatively small cost. Manufacturers can use it to make any article sell and dealers will find it an inexpensive way to contact a live buying trade. Don't delay—send in your copy now for the next issue. See bottom of page for rates.

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are indispensable to the modern, up to date sheet metal shop. Light, portable, yet extremely strong, they will make your shearing operations much faster, neater and more economical thru time saved on the job. They are made in two sizes to handle up to 14 or 10 gauge metal and are very reasonably priced.

Write today for literature and prices.

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Save Money, Time and Muscle

Drill Concrete with the "Do-All" Combination Electric Hammer and Drill. Set expansion bolts 10 to 20 times faster than with hand tools. Drills concrete, brick, stone, metal, wood. 2 tools in 1. Easy to maintain—Pays for itself. Bulletin No. 381.

WODACK ELECTRIC TOOL CORPORATION
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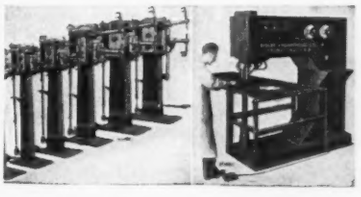

Electric welding equipment of every description to weld from a watch case to a door. Also special welding machines, spot, butt, seam, a. c. arc welders in sizes from ¼ to 500 KVA. Ask for our catalog No. 38-WT. Also production job welding.

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ORDER ONE TODAY!

The New, Enlarged 2nd Edition of Platte Overton's

"Forced Air Heating"

215 pages—Cloth Bound—$2.00

This new edition provides all the information needed by the contractor to enable him to design and install any forced air heating system correctly. It includes a brand new data sheet and shows how to fill it in. It outlines step by step a design procedure which may be applied to any job, and contains all the charts, tables, diagrams and formulas necessary. Send $2 for your copy today.

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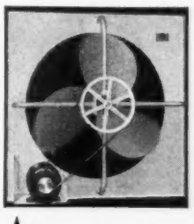
1000 SPOT WELDS . . . 3¢

That's the average cost of current used for 1000 spot welds. Just 3 cents! It'll help show you why the ACE spot welder will do your work faster, neater and cheaper than any other method. Drop us a line today for further information. No obligation, of course.

Built for production service. Engineered to meet the practical requirements of sheet metal shops. Available in sizes from 5 K. W. up.

Write Now for Free Catalog!

PIER EQUIPMENT MFG. CO.
Welding Equipment Division
731 Cross St., Benton Harbor, Mich.



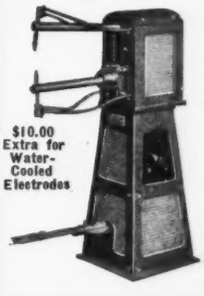
NEW 1939 COOLVENT ATTIC FAN

★ Improved, 3 bladed unit provides quiet, trouble free summer comfort-cooling of homes! Exclusive rubber mounted ball bearings and motor mounting arrangement. Sell scientifically engineered attic fan ventilation. CERTIFIED RATINGS! Write for new bulletins and price sheet.

AUTOVENT FAN & BLOWER CO.
1807-19 N. Kostner Ave., Chicago, Illinois

BEST BY TEST!

TRY IT!!



$10.00 Extra for Water-Cooled Electrodes

NEW IDEAL SPOT WELDER
Floor Type
7½ K.W. (10 KVA)
18" arms, 2 pieces
14 ga. $150.00
10 K.W. (13 KVA)
24" arms, 2 pieces
¼" $185.00

SPECIAL

8' 14 ga. Chgo. Stl. Power Shear with Motor Chgo. Stl. Press Brakes—8' 10 ga., 6' 10 ga., 10' ⅜", All Motor Drive. 10' 14 ga. Chgo. Steel Hand Brake, $325.

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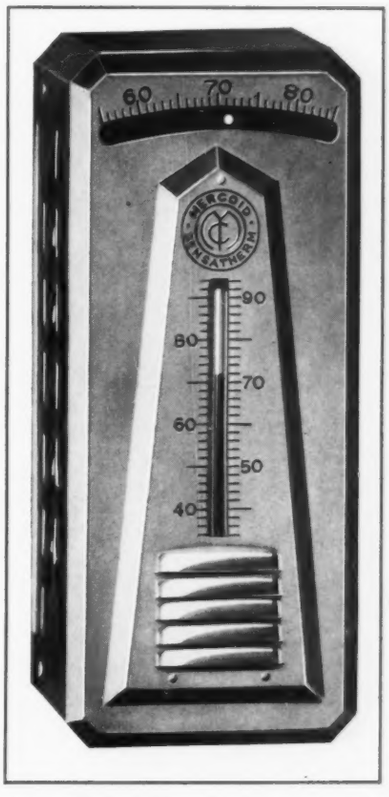
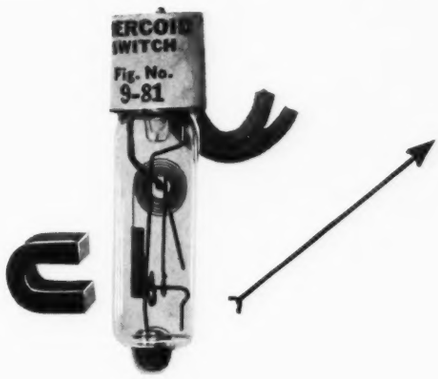
D I R T

Naturally comes from all directions and makes an inroad to everything exposed. ¶ The presence of dirt is more or less detrimental if not objectionable. Much time, effort and money is spent in getting rid of its perpetual accumulation and repairing consequent damages. Dirt in some places amounts to nothing more than an unpleasant sight, while in other places it is a source of considerable trouble; as in the case of exposed electrical contacting surfaces. ¶ Contact points are usually the first thing a service man checks when there is trouble in a line. "Dirty contacts" is not an uncommon verdict when attributing the cause of trouble. ¶ In this respect, Mercoid Controls are immune to dirt, as all Mercoid Controls are equipped exclusively with hermetically sealed mercury contact switches, and dirt can never affect their operation. That is one of the outstanding reasons why Mercoid Controls are noted for their reliable operation over a period of many years of service. Apart from this most desirable characteristic of Mercoid Controls, they incorporate many other essential features, all of which, are your assurance for better automatic control performance. ¶ Complete line of Mercoid Controls available for all requirements. ¶ Write for your copy of new catalog.

THE MERCOID CORPORATION • 4201 BELMONT AVE. • CHICAGO, ILL.



Mercoid Sensatherm — the thermostat of beauty and mechanical perfection



This Mercoid Switch is your protection in the Sensatherm

from farmers with MILCOR Metal Roofing

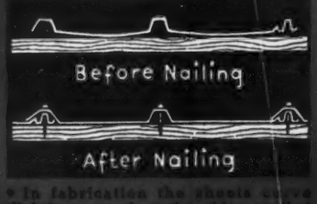
We buy plenty of MILCOR Twodrain Channel Roofing. The *Perfect Lap* feature "makes sense" to us

MILCOR "Twodrain" Channel Roofing

provides absolutely water-tight protection. Double channel drains any seepage. Three-crimp end lap gives extra protection against water penetration. Made plain (as illustrated above), and ornamental (as shown on roof of barn, above at top). Available without "Perfect Lap" feature if desired.

Anchor Shank Nail has raised anchor rings. Cannot pull or twist out. Soft lead head seals hole.
No. 915 Finial
No. 6 Gable Finial

Profile views showing "Perfect Lap" construction before and after nailing. Note the three-row metal-to-metal barrier against water penetration.



• In fabrication the sheets curve slightly upward at the sides so that a snug fit is assured when the sheets are nailed down.

Here's what you need to "cash in" o these money-making opportunitie

It's easy to sell farmers a new roof with Milco "Twodrain" Channel Roofing. You offer all the adva tages of metal . . . plus extra features that *give yo something to talk about besides price.*

Here is roofing built from the farmer's viewpoint, fo maximum protection of livestock and crops. The triple crimp Perfect Lap gives an absolutely leakproof end la — and the "Twodrain" Channel construction forms weather-tight side joint.

These features "click" with farmers . . . make it easy t close sales quickly. And your Milcor job stands up i service to fulfill farmers' expectations and make the glad to steer the roofing business of friends your wa

You can quickly sell farmers on the "spic and span appearance it gives to barns, hog houses, poultry house and numerous other farm buildings.

Milcor provides you with a *complete* line of popular roo ing, siding, and accessories, in a wide selection of type . . . and supplies your needs with speedy, cheerful, deli eries from conveniently located plants and warehouse

Units of the complete MILCOR line of Metal Roofing

The Milcor Roof Selector — a colo ful display unit — and free Milco booklets help you get more roofin business. Write for them and sta using them right away to build you profits. Also ask for free folder o Milcor "Twodrain" Channel Roofing

G

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